NATURAL RESOURCES DEFENSE COUNCIL

By Regular Mail

March 31, 2008

Naval Facilities Engineering Command, Atlantic
Attention: Code EV22 (Atlantic Fleet Sonar Project Manager)
6506 Hampton Boulevard
Norfolk, Virginia 23508-1278
Fax: 888-875-6781

Re: Draft Atlantic Fleet Active Sonar Training Environmental Impact Statement/ Overseas Environmental Impact Statement

Dear Sir or Madam:

On behalf of the Natural Resources Defense Council ("NRDC'), the Humane Society of the United States, the International Fund for Animal Welfare, PenderWatch & Conservancy, Cetacean Society International, the International Ocean Noise Coalition, Ocean Mammal Institute, and Ocean Futures Society and its founder Jean-Michel Cousteau, and on behalf of our millions of members, many thousands of whom reside along the eastern seaboard and the Gulf of Mexico, we are writing to submit comments on the Navy's Draft Atlantic Fleet Active Sonar Training Environmental Impact Statement/ Overseas Environmental Impact Statement ("DEIS"). See 73 Fed. Reg. 8856 (Feb. 15, 2008).[1]

It is undisputed that sound is a fundamental element of the marine environment. Whales, fish, and other wildlife depend on it for breeding, feeding, navigating, and avoiding predators—in short, for their survival. Many of the exercises proposed for the east coast and Gulf of Mexico would employ the same hull-mounted sonar systems that have been implicated in mass injuries and mortalities of whales around the globe. The same technology is known to affect marine mammals in countless other ways, inducing panic responses, displacing animals, and disrupting crucial behavior such as foraging.

By any measure, the sonar training contemplated in this DEIS is extensive. Even using the Navy's analysis, which we believe substantially understates the potential effects, the alternative allegedly preferred by Atlantic Fleet would cause 2.75 million biologically

[1] NRDC is aware that comments may be submitted separately by government agencies, individual scientists, environmental organizations, and the public. All of these comments are hereby incorporated by reference. The comments that follow do not constitute a waiver of any factual or legal issue raised by any of these organizations or individuals and not specifically discussed herein.

significant impacts on marine mammals along the U.S. east coast and in the Gulf of Mexico each year—or 13.75 million "takes" during the 5-year life of a Marine Mammal Protection Act permit. Under these circumstances, the Navy's exercises must be undertaken with particular care, dictated not by assertions of convenience or of history, but by a recognition that protection of the marine environment and safeguarding of our national defense are mutually dependent national interests that can and must be achieved through compliance with our federal environmental laws.

To that end, Congress has dictated through NEPA that, in planning exercises, the Navy must employ rigorous standards of environmental review, including a fair and objective description of potential impacts of the range, a comprehensive analysis of all reasonable alternatives, and a thorough delineation of measures to mitigate harm. Unfortunately, the DEIS released by the Navy falls far short of these standards. To cite just a few examples:

- The Navy throws out nearly the entire literature on behavioral impacts on marine mammals, in support of an abstract standard that contradicts the actual evidence of harm.

- It assumes that no marine mammals would be seriously injured or killed, despite a growing, peer-reviewed, scientific record of injuries and mortalities.

- It presumes, entirely without analysis, that all of its impacts are short-term in nature and that none will have cumulative effects, even though the same populations would repeatedly be affected.

- It claims, against generations of field experience, that marine mammals—even cryptic, deep-diving marine mammals like beaked whales—can effectively be spotted from fast-moving ships and avoided.

- It adopts mitigation that a federal court found to be "woefully inadequate and ineffectual," and fails to prescribe measures that have been used repeatedly by the Navy in the past, used by other navies, or required by the courts.

The picture that the Navy paints with such an analysis belies common sense. Although mass mortalities of beaked whales have resulted from the single transit of a sonar ship, the DEIS concludes that no animals would suffer serious injury or die during the many thousands of hours of sonar training. And although the Navy would use sonar extensively in many of the same areas of ocean, the DEIS concludes that no significant cumulative impacts would occur.

Nor is the Navy's analysis of alternatives any more credible. For sonar training, there is no step more crucial to reducing impacts than the careful siting of exercises, avoiding concentrations of vulnerable and endangered species and high abundances of marine life to the greatest extent possible. Yet, after spending what must have been millions of dollars on habitat analysis, the Navy did not establish a single environmental exclusion zone, neither along the eastern seaboard nor in the Gulf of Mexico, nor in any part of

the vast AFAST study area, which appears to run more than half the size of the continental United States. No exclusions are made for North Atlantic right whales, the critically endangered species that has been the focus of enormous conservation effort; for harbor porpoises, a strategic stock that even the Navy admits is extremely vulnerable to sonar; for other highly vulnerable species, such as beaked whale that have been associated with severe sonar-related injury, and species listed under the Endangered Species Act; for areas with large concentrations of marine mammals; or even for national marine sanctuaries or other protected areas along the U.S. coast. And this is the case despite the Navy's admission of flexibility in the siting of exercises and a past record of using geographic mitigation to reduce harm. Similarly, other proven and practicable mitigation measures are quickly dismissed.

All of this clearly suggests the sort of post hoc decision-making that NEPA is intended to avoid.

The DEIS is fatally flawed by its inconsistency with the weight of scientific evidence and with the standards of environmental review embodied in NEPA. As a matter of science, it lacks objectivity; as a matter of law, it is insupportable, and the hard-line position that it represents has repeatedly been rejected by the courts. We urge the Navy to revise its analysis consistent with federal law and to produce a mitigation plan that truly maximizes environmental protection given the Navy's actual operational needs. We also urge the Navy to make available to the public the data and modeling on which its analysis is based.

I. IMPACTS OF HIGH-INTENSITY SONAR

Scientists agree, and the publicly available scientific literature confirms, that the intense sound generated by military active sonar can induce a range of adverse effects in whales and other species, from significant behavioral changes to stranding and death. By far the most widely-reported and dramatic of these effects are the mass strandings of beaked whales and other marine mammals that have been associated with military sonar use. Associated strandings have occurred in Greece, during the trial of a NATO sonar system; on the islands of Madeira and Porto Santo, during a NATO event involving subs and surface ships; in the U.S. Virgin Islands, during a training exercise for Navy battle groups; in the Bahamas, the Canaries, Japan, Hawaii, Alaska, and other spots around the world.[2] On several occasions, bodies have been recovered in time to give evidence of acoustic trauma. In a 2004 symposium at the International Whaling Commission, more than 100 whale biologists concluded that the association between

[2] A summary of the strandings record appears below at section II(B)(2)(a) ("Strandings and Mortalities Associated with Mid-Frequency Sonar").

sonar and beaked whale deaths "is very convincing and appears overwhelming."[3] In the United States, an expert report commissioned by the Navy said much the same thing.[4]

Mass mortalities, though an obvious focus of much reporting and concern, are likely only the tip of the iceberg of sonar's harmful effects. Marine mammals are believed to depend on sound to navigate, find food, locate mates, avoid predators, and communicate with each other. Flooding their habitat with man-made, high-intensity noise interferes with these and other functions. In addition to strandings and non-auditory injuries, the harmful effects of high-intensity sonar include:

- temporary or permanent loss of hearing, which impairs an animal's ability to communicate, avoid predators, and detect and capture prey;
- avoidance behavior, which can lead to abandonment of habitat or migratory pathways;
- disruption of biologically important behaviors such as mating, feeding, nursing, or migration, or loss of efficiency in conducting those behaviors;
- aggressive (or agonistic) behavior, which can result in injury;
- masking of biologically meaningful sounds, such as the call of predators or potential mates;
- chronic stress, which can compromise viability, suppress the immune system, and lower the rate of reproduction;
- habituation, causing animals to remain near damaging levels of sound, or sensitization, exacerbating other behavioral effects; and
- declines in the availability and viability of prey species, such as fish and shrimp.

Over the past 20 years, a substantial literature has emerged documenting the range of effects of ocean noise on marine mammals.[5]

Marine mammals are not the only species affected by undersea noise. Impacts on fish are of increasing concern due to several recent studies demonstrating hearing loss and widespread behavioral disruption in commercial species of fish and to reports, both

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[3] International Whaling Commission, 2004 Report of the Scientific Committee, Annex K at § 6.4 (2004).

[4] H. Levine, Active Sonar Waveform 1 (2004) (JASON Group Rep. JSR-03-200) (describing evidence of sonar causation as "completely convincing"). The strandings record is further described infra at section II(B)(2)(a).

[5] For a review of research on behavioral and auditory impacts of undersea noise, see, e.g., L.S. Weilgart, The Impacts of Anthropogenic Ocean Noise on Cetaceans and Implications for Management, 85 Canadian Journal of Zoology 1091-1116 (2007); W.J. Richardson, C.R. Greene, Jr., C.I. Malme, and D.H. Thomson, Marine Mammals and Noise (1995); National Research Council, Ocean Noise and Marine Mammals (2003); Whale and Dolphin Conservation Society, Oceans of Noise (2004).

experimental and anecdotal, of catch rates plummeting in the vicinity of noise sources.[6] Sea turtles, most of which are considered threatened or endangered under federal law, have been shown to engage in escape behavior and to experience heightened stress in response to noise. And noise has been shown in several cases to kill, disable, or disrupt the behavior of invertebrates, many of which possess ear-like structures or other sensory mechanisms that could leave them vulnerable. It is clear that intense sources of noise are capable of affecting a wide class of ocean life.

II. THE NAVY'S COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT

Enacted by Congress in 1969, NEPA establishes a national policy to "encourage productive and enjoyable harmony between man and his environment" and "promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man." 42 U.S.C. § 4321. In order to achieve its broad goals, NEPA mandates that "to the fullest extent possible" the "policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with [NEPA]." 42 U.S.C. § 4332. As the Supreme Court explained,

> NEPA's instruction that all federal agencies comply with the impact statement requirement – and with all the requirements of § 102 – "to the fullest extent possible" [cit. omit.] is neither accidental nor hyperbolic. Rather the phrase is a deliberate command that the duty NEPA imposes upon the agencies to consider environmental factors not be shunted aside in the bureaucratic shuffle. Flint Ridge Development Co. v. Scenic Rivers Ass'n, 426 U.S. 776, 787 (1976).

Central to NEPA is its requirement that, before any federal action that "may significantly degrade some human environmental factor" can be undertaken, agencies must prepare an environmental impact statement. Steamboaters v. F.E.R.C., 759 F.2d 1382, 1392 (9th Cir. 1985) (emphasis in original). The fundamental purpose of an EIS is to force the decision-maker to take a "hard look" at a particular action – at the agency's need for it, at the environmental consequences it will have, and at more environmentally benign alternatives that may substitute for it – before the decision to proceed is made. 40 C.F.R. §§ 1500.1(b), 1502.1; Baltimore Gas & Electric v. NRDC, 462 U.S. 87, 97 (1983). The law is clear that the EIS must be a pre-decisional, objective, rigorous, and neutral document, not a work of advocacy to justify an outcome that has been foreordained.

In nearly every respect, the Navy's DEIS fails to meet the high standards of rigor and objectivity established under NEPA.

A. Impacts on Marine Mammals

[6] See the discussion below, at section II(C) of "Impacts on Fish and Fisheries."

Fundamental to satisfying NEPA's requirement of fair and objective review, agencies must ensure the "professional integrity, including scientific integrity," of the discussions and analyses that appear in environmental impact statements. 40 C.F.R. § 1502.24. To this end, they must make every attempt to obtain and disclose data necessary to their analysis. The simple assertion that "no information exists" will not suffice; unless the costs of obtaining the information are exorbitant, NEPA requires that it be obtained. See 40 C.F.R. § 1502.22(a). Agencies are further required to identify their methodologies, indicate when necessary information is incomplete or unavailable, acknowledge scientific disagreement and data gaps, and evaluate indeterminate adverse impacts based upon approaches or methods "generally accepted in the scientific community." 40 C.F.R. §§ 1502.22(2), (4), 1502.24. Such requirements become acutely important in cases where, as here, so much about a program's impacts depend on newly emerging science.

In this case, the Navy's assessment of impacts on marine mammals is consistently undermined by its failure to meet these fundamental responsibilities of scientific integrity, methodology, investigation, and disclosure. As with the Navy's initial Draft Environmental Impact Statement for the Undersea Warfare Training Range, the DEIS excludes a great deal of relevant information adverse to the Navy's interests, uses approaches and methods that would not be acceptable to the scientific community, and ignores whole categories of impacts. In short, it leaves the public with an analysis of environmental harm—behavioral, auditory, and physiological—that is at odds with established scientific authority and practice.

1. Thresholds of Injury, Hearing Loss, and Significant Behavioral Change

At the core of the Navy's assessment of acoustic impacts on the training range are the thresholds it has established for physical injury, hearing loss, and significant behavioral harassment, the levels above which meaningful effects on marine mammals are found to occur. There are gross problems with the Navy's thresholds here.

a. Injury Threshold

The Navy fixes its highest threshold of 215 dB re 1 $\mu Pa^{2}\bullet s$—which it considers the ground floor for direct physical injury—on the amount of energy necessary to induce permanent hearing loss (or "threshold shift") in marine mammals. DEIS at 4-39. Beneath this decision lies an assumption that the tissues of the ear are "the most susceptible to physiological effects of underwater sound" (DEIS at 4-31, 33), and, indeed, a few paragraphs are spent in an effort to set aside other types of injury that have been identified or observed. Unfortunately, the Navy's position is inconsistent with the scientific literature, with the legal standard of review, and with recent court decisions. See NRDC v. Winter, 527 F.Supp.2d 1216 (C.D. Cal. 2008), aff'd __ F.3d __, 2008 WL 565680 (9th Cir. 2008); Ocean Mammal Institute v. Gates, 2008 WL 564664 (D. Hawaii 2008).

First, the DEIS disregards data gained from actual whale mortalities. The best available scientific evidence, as reported in the peer-reviewed literature, indicates that sound levels at the most likely locations of beaked whales beached in the Bahamas strandings run far lower than the Navy's threshold for injury here: approximately 150-160 dB re 1 μPa for 50-150 seconds, over the course of the transit.[7] A further modeling effort, undertaken in part by the Office of Naval Research, suggests that the mean exposure level of beaked whales, given their likely distribution in the Bahamas' Providence Channels and averaging results from various assumptions, may have been lower than 140 dB re 1 μPa.[8] (In another context, where it wishes to dismiss evidence of impacts to hearing at lower levels than its standard allows, the Navy refers to the statistical mean as "'the best unbiased estimator.'" DEIS at 4-41.) Factoring in duration, then, evidence of actual sonar-related mortalities would compel a maximum energy level ("EL") threshold for serious injury on the order of 182 dB re 1 $\mu Pa^{2\bullet}s$, at least for beaked whales. Indeed, to pay at least some deference to the literature, the Navy—under pressure from NMFS—has previously assumed that non-lethal injury would occur in beaked whales exposed above 173 dB re 1 $\mu Pa^{2\bullet}s$.[9] The Navy's claim that no beaked whales would suffer injury, let alone serious injury or mortality, because none would be exposed to levels above 215 dB re 1 μPa is simply not tenable.

Second, the DEIS fails to take proper account of published research on bubble growth in marine mammals, which separately indicates the potential for injury and death at levels far lower than the Navy proposes. According to the best available scientific evidence, as represented by multiple papers in flagship journals such as *Nature* and *Veterinary Pathology*, gas bubble growth is the causal mechanism most consistent with the observed injuries;[10] in addition, it was singularly and explicitly highlighted as plausible by an expert panel

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[7] J. Hildebrand, "Impacts of Anthropogenic Sound," in T.J. Ragen, J.E. Reynolds III, W.F. Perrin, and R.R. Reeves, Conservation beyond Crisis (2005). See also International Whaling Commission, 2004 Report of the Scientific Committee, Annex K at § 6.3.

[8] J. Hildebrand, K. Balcomb, and R. Gisiner, Modeling the Bahamas Beaked Whale Stranding of March 2000 (2004) (presentation given at the third plenary meeting of the U.S. Marine Mammal Commission Advisory Committee on Acoustic Impacts on Marine Mammals, 29 July 2004).

[9] See, e.g., Navy, Joint Task Force Exercises and Composite Training Unit Exercises Final Environmental Assessment/ Overseas Environmental Assessment at 4-44, 4-46 to 4-47 (2007).

[10] See, e.g., A. Fernández, J.F. Edwards, F. Rodríguez, A. Espinosa de los Monteros, P. Herráez, P. Castro, J.R. Jaber, V. Martín, and M. Arbelo, 'Gas and Fat Embolic Syndrome' Involving a Mass Stranding of Beaked Whales (Family Ziphiidae) Exposed to Anthropogenic Sonar Signals, 42 Veterinary Pathology 446 (2005); P.D. Jepson, M. Arbelo, R. Deaville, I.A.P. Patterson, P. Castro, J.R. Baker, E. Degollada, H.M. Ross, P. Herráez, A.M. Pocknell, F. Rodríguez, F.E. Howie, A. Espinosa, R.J. Reid, J.R. Jaber, V. Martín, A.A. Cunningham, and A. Fernández, Gas-Bubble Lesions in Stranded Cetaceans, 425 Nature 575-576 (2003); R.W. Baird, D.L. Webster, D.J. McSweeney, A.D. Ligon, G.S. Schorr, and J. Barlow, Diving Behavior of Cuvier's (Ziphius cavirostris) and Blainville's (Mesoplodon densirostris) Beaked Whales in Hawai'i," 84 Canadian Journal of Zoology 1120-1128 (2006).

convened by the Marine Mammal Commission, in which the Navy participated.[11] The Navy's argument to the contrary simply misrepresents the available literature. What is more, the default assumption in the DEIS – that whales suffer injury only through the physical act of stranding itself (or through direct tissue injury) – has been soundly rejected in the literature.[12] The Navy's refusal to consider these impacts is insupportable under NEPA. 42 C.F.R. §§ 1502.22, 1502.24.

Third, the numbers do not reflect other non-auditory physiological impacts, as from stress and from chronic exposure during development, which are discussed further among "Other Impacts on Marine Mammals" (below).

Fourth, the Navy's exclusive reliance on energy flux density as its unit of analysis does not take other potentially relevant acoustic characteristics into account. For example, an expert group commissioned by the Office of Naval Research in 2003 to provide recommendations on mitigation suggested that peak power may matter more to beaked whale mortalities than integrated energy.[13] Reflecting this uncertainty, the Navy should establish a dual threshold for marine mammal injury.

Fifth, the Navy's calculation of permanent threshold shift (which it equates to the onset on injury) is based on studies of temporary threshold shift that, as discussed below, have a number of significant limitations.

b. Hearing Loss Threshold

The DEIS sets its threshold for temporary hearing loss, or "threshold shift" ("TTS"), at 195 dB re 1 $\mu Pa^{2\bullet}s$. DEIS at 4-39. It bases this threshold primarily on a synthesis of studies on two species of cetaceans, bottlenose dolphins and beluga whales, conducted by the Navy's SPAWAR laboratory in San Diego and, to a lesser extent, by researchers at the University of Hawaii. DEIS at 4-36.

First, the Navy's extrapolation of data from bottlenose dolphins and belugas to all cetaceans is not justifiable. Given the close association between acoustic sensitivity and threshold shift, such an approach must presume that belugas and bottlenose dolphins have the best hearing sensitivity in the mid-frequencies of any cetacean. Yet, as noted below at subsection (c) ("Threshold for Significant

[11] T.M. Cox, T.J. Ragen, A.J. Read, E. Vos, R.W. Baird, K. Balcomb, J. Barlow, J. Caldwell, T. Cranford, L. Crum, A. D'Amico, G. D'Spain, A. Fernández, J. Finneran, R. Gentry, W. Gerth, F. Gulland, J. Hildebrand, D. Houser, T. Hullar, P.D. Jepson, D. Ketten, C.D. MacLeod, P. Miller, S. Moore, D. Mountain, D. Palka, P. Ponganis, S. Rommel, T. Rowles, B. Taylor, P. Tyack, D. Wartzok, R. Gisiner, J. Mead, and L. Benner, Understanding the Impacts of Anthropogenic Sound on Beaked Whales, 7 Journal of Cetacean Research & Management 177-87 (2006).

[12] Id.

[13] Levine, Active Sonar Waveform at 27.

Behavioral Change"), harbor porpoises and killer whales are more sensitive over part of the mid-frequency range than are the two species in the SPAWAR and Hawaii studies.[14] Furthermore, the animals in the studies may not represent the full range of variation even within their own species, particularly given their age and situation: the SPAWAR animals, for example, have been housed for years in a noisy bay.[15]

Second, the small size of the data set generated by these studies leads the Navy to some arbitrary interpretations. For example, the Navy effectively excludes the results of one study that found threshold shift originating in a bottlenose dolphin at 190 re 1 $\mu Pa^{2\bullet}s$, which is a full 5 dB re 1 $\mu Pa^{2\bullet}s$ below its proposed standard. DEIS at 4-36. The basis for this exclusion is the equal energy hypothesis: if you assume that the threshold for hearing loss decreases by a constant amount as the duration of a sound increases, you can fit a straight line connecting the data points that the studies have produced. Yet where the line falls can remain somewhat arbitrary given the small number of points on the chart. In this case, the Navy relied heavily for its line-drawing on a single data point, from a single subject, lying at a distance from the main data cluster (Nachtigall et al. 2003b). Alternatively, it might have dropped the line about 5 dB lower, which would have brought it closer to a third cluster, made of multiple data points from multiple subjects, and conformed more exactly to the point above which TTS was consistently found in the main cluster. See DEIS at Fig. 4.1.2.4.6-1. In other words, the Navy's own graphic indicates that a 190 dB re 1 $\mu Pa^{2\bullet}s$ threshold would have fit its data better than the threshold it established and would have had the advantage of being marginally more conservative given the enormous uncertainties—yet there is no justification in the DEIS for the choice it made. The Navy's assumption of a 195 re 1 $\mu Pa^{2\bullet}s$ EL threshold in the present DEIS, as in all documents that depend on the same methodology, is arbitrary and capricious.

c. Threshold for Significant Behavioral Change

The threshold used in the DEIS differs the one used by the Navy to estimate marine mammal take during RIMPAC 2006 and during subsequent major exercises off California and Hawaii. In short, instead of using an EL standard of 173 dB re 1 $\mu Pa^{2\bullet}s$, which NMFS had insisted the Navy adopt, the Navy rather applies a dose-response function that begins at 120 dB re 1 μPa and reaches its mean at 165 dB re 1 μPa.

On the Hawaii Range Complex, the only region for which comparative data are publicly available, the change from the Navy's current standard is significant.

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[14] Richardson et al., Marine Mammals and Noise at 209.

[15] M.L.H. Cook, Behavioral and Auditory Evoked Potential (AEP) Hearing Measurements in Odontocete Cetaceans (2006) (Ph.D. thesis).

Under the current standard, the RIMPAC 2006 event was expected to result in slightly less than 33,000 behavioral takes of marine mammals; under the proposed one, RIMPAC events conducted with the same number of hours of sonar use would supposedly cause fewer than 6,000 takes.[16] Under the current standard, the conduct of 6 USWEX events was predicted to cause over 30,000 behavioral takes of marine mammals; under the proposed one, annual takes would not exceed 20,000.[17] In the AFAST study area, the Navy estimates that sonar training will result each year in approximately 2.75 million behavioral takes of marine mammals. The Hawaii data suggests that this take level—while still very large—represents far less than what the Navy would have predicted had it continued to use the previous EL-based standard of 173 re 1 $\mu Pa^{2\bullet}s$.

As the Navy should well know, agencies are not entitled to substantial deference under the Administrative Procedure Act when they reverse previously held positions. Among the most significant problems:

First, the Navy again relies on inapposite studies of temporary threshold shift in captive animals for its primary source of data. Marine mammal scientists have long recognized the deficiencies of using captive subjects in behavioral experiments, and to blindly rely on this material, to the exclusion of copious data on animals in the wild, is not supportable by any standard of scientific inquiry. Cf. 42 C.F.R. § 1502.22. The problem is exacerbated further by the fact that the subjects in question, roughly two belugas and five bottlenose dolphins, are highly trained animals that have been working in the Navy's research program in the SPAWAR complex for years.[18] Indeed, the disruptions observed by Navy scientists, which included pronounced, aggressive behavior ("attacking" the source) and avoidance of feeding areas associated with the exposure, occurred during a research protocol that the animals had been rigorously trained to complete.[19] The SPAWAR studies have several other major deficiencies that NMFS, among others, has repeatedly pointed out; and in relying so heavily on them, the Navy has once again ignored the comments of numerous marine mammal behaviorists on the Navy's USWTR DEIS, which sharply criticize the Navy for putting any serious stock in them.[20]

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[16] Navy, Hawaii Range Complex Draft Supplemental Environmental Impact Statement/ Overseas Environmental Impact Statement at 3-24 (2008).

[17] Id. at 3-36.

[18] See, e.g., S.H. Ridgway, D.A. Carder, R.R. Smith, T. Kamolnick, C.E. Schlundt, and W.R. Elsberry, Behavioral Responses and Temporary Shift in Masked Hearing Threshold of Bottlenose Dolphins, Tursiops truncates, to 1-Second Tones of 141 to 201 dB re 1 μPa (1997) (SPAWAR Tech. Rep. 1751, Rev. 1).

[19] C.E. Schlundt, J.J. Finneran, D.A. Carder, and S.H. Ridgway, Temporary Shift in Masked Hearing Thresholds of Bottlenose Dolphins, Tursiops truncates, and White Whales, Delphinapterus leucas, after Exposure to Intense Tones, 107 Journal of the Acoustical Society of America 3496, 3504 (2000).

[20] See comments from M. Johnson, D. Mann, D. Nowacek, N. Soto, P. Tyack, P. Madsen, M. Wahlberg, and B. Møhl, received by the Navy on the Undersea Warfare Training Range DEIS. These comments,

Second, the Navy appears to have misused data garnered from the Haro Strait incident—one of only three data sets it considers—by including only those levels of sound received by the "J" pod of killer whales when the USS Shoup was at its closest approach (see discussion below at section A.2). DEIS at 4-51. These numbers represent the maximum level at which the pod was harassed; in fact, the whales were reported to have broken off their foraging and to have engaged in significant avoidance behavior at far greater distances from the ship, where received levels would have been orders of magnitude lower.[21] Not surprisingly, then, the Navy's results are inconsistent with other studies of the effects of various noise sources, including mid-frequency sonar, on killer whales. We must insist that the Navy provide the public with its propagation analysis for the Haro Strait event, and also describe precisely how this data set, along with results from the SPAWAR and Nowacek et al. studies, were factored into its development of the behavioral risk function.

Third, the Navy excludes a substantial body of research on wild animals (and some research on other experimental animals as well, within a behavioral experimental protocol). Perhaps most glaringly, while the DEIS appears to acknowledge the strong sensitivity of harbor porpoises by setting an absolute take threshold of 120 dB (SPL)—a sensitivity that, as NMFS has noted, is reflected in numerous wild and captive animal studies—it improperly fails to include any of these studies in its data set. DEIS at 4-48, 4-50-51. The result is clear bias, for even if one assumes (for argument's sake) that the SPAWAR data has value, the Navy has included a relatively insensitive species in setting its general standard for marine mammals while excluding a relatively sensitive one. By placing great weight on the SPAWAR data, excluding other relevant data, and misusing the Haro Strait data, the Navy has produced a risk function that is belied by the existing record: one that clearly demonstrates high risk of significant behavioral impacts from mid-frequency sources, including mid-frequency sonar, on a diverse range of wild species (e.g., right whales, minke whales, killer whales, harbor porpoises, Dall's porpoises) at levels below the function curve.[22]

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and those of the fishermen cited below, are hereby incorporated into this letter. See also Letter from Rodney F. Weiher, NOAA, to Keith Jenkins, Naval Facilities Engineering Command Atlantic (Jan. 30, 2006); Memo, A.R. document 51, NRDC v. Winter, CV 06-4131 FMC (JCx) (undated NOAA memorandum).

[21] See,. e.g., NMFS, Assessment of Acoustic Exposures on Marine Mammals in Conjunction with USS Shoup Active Sonar Transmissions in the Eastern Strait of Juan de Fuca and Haro Strait, Washington—5 May 2003 at 4-6 (2005).

[22] See, e.g., id.; R.A. Kastelein, H.T. Rippe, N. Vaughan, N.M. Schooneman, W.C. Verboom, and D. de Haan, The Effects of Acoustic Alarms on the Behavior of Harbor Porpoises in a Floating Pen, 16 Marine Mammal Science 46 (2000); P.F. Olesiuk, L.M. Nichol, M.J. Sowden, and J.K.B. Ford, Effect of the Sound Generated by an Acoustic Harassment Device on the Relative Abundance of Harbor Porpoises in Retreat Passage, British Columbia, 18 Marine Mammal Science 843 (2002); NMFS, Assessment of Acoustic Exposures on Marine Mammals in Conjunction with USS Shoup Active Sonar Transmissions

Fourth, any risk function must take account of the social ecology of some marine mammal species. For species that travel in tight-knit groups, an effect on certain individuals can adversely influence the behavior of the whole. (Pilot whales, for example, are prone to mass strand for precisely this reason; the plight of the 200 melon-headed whales in Hanalei Bay, and of the "J" pod of killer whales in Haro Strait, as described below, may be pertinent examples.) Should those individuals fall on the more sensitive end of the spectrum, the entire group or pod can suffer significant harm at levels below what the Navy would take as the mean. In developing its "K" parameter, the Navy must take account of such potential indirect effects. 42 C.F.R. § 1502.16(b).

Fifth, the Navy's exclusive reliance on sound pressure levels ("SPLs") in setting a behavioral threshold is misplaced. The discussion in the DEIS speaks repeatedly of uncertainty in defining the risk function and recapitulates, in its summary of the earlier methodology, the benefits implicit in the use of a criterion that takes duration into account. It is therefore appropriate for the Navy to set dual thresholds for behavioral effects, one based on SPLs and one based on energy flux density levels ("ELs").

Sixth, as noted below in the discussion of Cumulative Impacts, the Navy's threshold is applied in such a way as to preclude any assessment of long-term behavioral impacts on marine mammals. It does not account, to any degree, for the problem of repetition: the way that apparently insignificant impacts, such as subtle changes in dive times or vocalization patterns, can become significant if experienced repeatedly or over time.[23]

For all these reasons, the thresholds of injury, hearing loss, and significant behavioral change utilized by the Navy in this DEIS are fundamentally inconsistent with the scientific literature on acoustic impacts, and, indeed, with marine mammal science in general, and, if used to support a Record of Decision, would violate

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in the Eastern Strait of Juan de Fuca and Haro Strait, Washington, 5 May 2003 at 10 (2005); D.P. Nowacek, M.P. Johnson, and P.L. Tyack, North Atlantic Right Whales (Eubalaena glacialis) Ignore Ships but Respond to Alerting Stimuli, 271 Proceedings of the Royal Society of London, Part B: Biological Sciences 227 (2004); Statements of D. Bain, K. Balcomb, and R. Osborne (May 28, 2003) (taken by NMFS enforcement on Haro Strait incident); Letter from D. Bain to California Coastal Commission (Jan. 9, 2007); E.C.M. Parsons, I. Birks, P.G.H. Evans, J.C.D. Gordon, J.H. Shrimpton, and S. Pooley, The Possible Impacts of Military Activity on Cetaceans in West Scotland, 14 European Research on Cetaceans 185-190 (2000); P. Kvadsheim, F. Benders, P. Miller, L. Doksaeter, F. Knudsen, P. Tyack, N. Nordlund, F.-P. Lam, F. Samarra, L. Kleivane, and O.R. Godø, Herring (Sild), Killer Whales (Spekkhogger) and Sonar – the 3S-2006 Cruise Report with Preliminary Results (2007).

[23] The importance of this problem for marine mammal conservation is reflected in a recent NRC report, which calls for models that, inter alia, translate such subtle changes into disruptions in key activities like feeding and breeding that are significant for individual animals. National Research Council. Marine Mammal Populations and Ocean Noise: Determining When Noise Causes Biologically Significant Effects 35-68 (2005).

NEPA. Please note that we will forward a more detailed, technical analysis of the Navy's risk function next month.

2. Strandings and Mortalities Associated with Mid-Frequency Sonar

Over the last decade, the association between military active sonar and whale mortalities has become a subject of considerable scientific interest and concern. That interest is reflected in the publication of numerous papers in peer-reviewed journals, in reports by inter-governmental bodies such as the IWC's Scientific Committee, and in evidence compiled from a growing number of mortalities associated with sonar.

In March 2000, for example, sixteen whales from at least three species— including two minke whales—stranded over 150 miles of shoreline along the northern channels of the Bahamas. The beachings occurred within 24 hours of Navy ships using mid-frequency sonar (AN/SQS-53C and AN/SQS-56) in those same channels.[24] Post-mortem examinations found, in all whales examined, hemorrhaging in and around the ears and other tissues related to sound conduction or production, such as the larynx and auditory fats, some of which was debilitative and potentially severe.[25] It is now accepted that these mortalities were caused, through an unknown mechanism, by the Navy's use of mid-frequency sonar.

The Bahamas event is one of numerous mortality events coincident with military activities and active sonar that have now been documented:[26]

(1) Canary Islands 1985-1991 – Between 1985 and 1989, at least three separate mass strandings of beaked whales occurred in the Canary Islands, as reported in Nature.[27] Thirteen beaked whales of two species were killed in the February 1985 strandings, six whales of three species stranded in November 1988, and some twenty-four whales of three species stranded in October 1989—all while naval vessels were conducting exercises off shore.[28] An additional stranding of Cuvier's beaked whales, also coinciding with a naval exercise, occurred in

[24] Commerce and Navy, Joint Interim Report at iii, 16.

[25] Id.

[26] The following is not a complete list, as other relevant events have been reported in Bonaire, Japan, Taiwan, and other locations. See, e.g., R.L. Brownell, Jr., T. Yamada, J.G. Mead, and A.L. van Helden, Mass Strandings of Cuvier's Beaked Whales in Japan: U.S. Naval Acoustic Link? (2004) (IWC SC/56E37); J.Y. Wang and S.-C. Yang, Unusual Cetacean Stranding Events of Taiwan in 2004 and 2005, 8 Journal of Cetacean Research and Management 283-292 (2006); P.J.H. van Bree and I. Kristensen, On the Intriguing Stranding of Four Cuvier's Beaked Whales, Ziphius cavirostris, G. Cuvier, 1823, on the Lesser Antillean Island of Bonaire, 44 Bijdragen tot de Dierkunde 235-238 (1974).

[27] M. Simmonds and L.F. Lopez-Jurado, Whales and the Military, 337 Nature 448 (1991).

[28] Id.

1991.[29] It was reported that mass live strandings occurred each time exercises took place in the area.[30]

(2) Greece 1996, 1997 – In 1996, twelve Cuvier's beaked whales stranded along 35 kilometers on the west coast of Greece. The strandings were correlated, by an analysis published in Nature, with the test of a low- and mid-frequency active sonar system operated by NATO.[31] A subsequent NATO investigation found the strandings to be closely timed with the movements of the sonar vessel, and ruled out all other physical environmental factors as a cause.[32] The following year saw nine additional Cuvier's beaked whales strand off Greece, again coinciding with naval activity.[33]

(3) Virgin Islands 1999 – In October 1999, four beaked whales stranded in the U.S. Virgin Islands as the Navy began an offshore exercise. A wildlife official from the Islands reported the presence of "loud naval sonar."[34] When NMFS asked the Navy for more information about its exercise, the Department's response was to end the consultation that it had begun for the exercise under the Endangered Species Act.[35] In January 1998, according to a NMFS biologist, a beaked whale "stranded suspiciously" at Vieques as naval exercises were set to commence offshore.[36]

(4) Bahamas 2000 – As described above.

(5) Madeira 2000 -- In May 2000, four beaked whales stranded on the beaches of Madeira while several NATO ships were conducting an exercise near shore. Scientists investigating the stranding found that the whales' injuries—including "blood in and around the eyes, kidney lesions, pleural hemorrhage"—and the

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[29] V. Martín, A. Servidio, and S. Garcia, Mass Strandings of Beaked Whales in the Canary Islands, in P.G.H. Evans and L.A. Miller, Proceedings of the Workshop on Active Sonar and Cetaceans 33-36 (2004).

[30] Simmonds and Lopez-Jurado, Whales and the Military, 337 Nature at 448.

[31] A. Frantzis, Does Acoustic Testing Strand Whales? 392 Nature 29 (1998).

[32] See SACLANT Undersea Research Center, Summary Record, La Spezia, Italy, 15-17 June 1998, SACLANTCEN Bioacoustics Panel, SACLANTCEN M-133 (1998).

[33] Id.; A. Frantzis, The First Mass Stranding That Was Associated with the Use of Active Sonar (Kyparissiakos Gulf, Greece, 1996), in P.G.H. Evans and L.A. Miller, Proceedings of the Workshop on Active Sonar and Cetaceans 14-20 (2004).

[34] Personal communication of Dr. David Nellis, U.S. Virgin Island Department of Fish and Game, to Eric Hawk, NMFS (Oct. 1999); personal communication from Ken Hollingshead, NMFS, to John Mayer, Marine Acoustics Inc. (March 19, 2002).

[35] Letter from William T. Hogarth, Regional Administrator, NMFS Southeast Regional Office, to RADM J. Kevin Moran, Navy Region Southeast (undated); personal communication from Ken Hollingshead, NMFS, to John Mayer, Marine Acoustics Inc. (March 19, 2002).

[36] Personal communication from Eric Hawk, NMFS, to Ken Hollingshead, NMFS (Feb. 12, 2002).

pattern of their stranding suggest "that a similar pressure event [*i.e.*, similar to that at work in the Bahamas] precipitated or contributed to strandings in both sites."[37]

(6) Canary Islands 2002 – In September 2002, at least fourteen beaked whales from three different species stranded in the Canary Islands. Four additional beaked whales stranded over the next several days.[38] The strandings occurred while a Spanish-led naval exercise that included U.S. Navy vessels and at least one ship equipped with mid-frequency sonar was conducting anti-submarine warfare exercises in the vicinity.[39] The subsequent investigation, as reported in the journals Nature and Veterinary Pathology, revealed a variety of traumas, including emboli and lesions suggestive of decompression sickness.[40]

(7) Washington 2003 – In May 2003, the U.S. Navy vessel USS Shoup was conducting a mid-frequency sonar exercise while passing through Haro Strait, off the coast of Washington. According to one contemporaneous account, "[d]ozens of porpoises and killer whales seemed to stampede all at once . . . in response to a loud electronic noise echoing through" the Strait.[41] Several field biologists present at the scene reported observing a pod of endangered orcas bunching near shore and engaging in very abnormal behavior consistent with avoidance, a minke whale "porpoising" away from the sonar ship, and harbor porpoises fleeing the vessel in large numbers.[42] Eleven harbor porpoises—an abnormally high number given the average stranding rate of six per year—were found beached in the area of the exercise.[43]

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[37] D.R. Ketten, Beaked Whale Necropsy Findings 22 (2002) (paper submitted to NMFS); L. Freitas, The Stranding of Three Cuvier's Beaked Whales Ziphius Cavirostris in Madeira Archipelago—May 2000, in P.G.H. Evans and L.A. Miller, Proceedings of the Workshop on Active Sonar and Cetaceans 28-32 (2004).

[38] Vidal Martin et al., Mass Strandings of Beaked Whales in the Canary Islands, in Proceedings of the Workshop on Active Sonar and Cetaceans 33 (P.G.H. Evans & L.A. Miller eds., 2004); Fernández et al., 'Gas and Fat Embolic Syndrome', 42 Veterinary Pathology at 446-57.

[39] Fernández et al., 'Gas and Fat Embolic Syndrome', 42 Veterinary Pathology at 446; K.R. Weiss, Whale Deaths Linked to Navy Sonar Tests, L.A. Times, Oct. 1, 2002, at A3.

[40] Fernández et al., 'Gas and Fat Embolic Syndrome', 42 Veterinary Pathology at 446-57; Jepson et al., Gas-Bubble Lesions, 425 Nature at 575-76.

[41] Christopher Dunagan, Navy Sonar Incident Alarms Experts, Bremerton Sun, May 8, 2003.

[42] NMFS, Assessment of Acoustic Exposures at 6, 9.

[43] NMFS, Preliminary Report: Multidisciplinary Investigation of Harbor Porpoises (Phocoena phocoena) Stranded in Washington State from 2 May – 2 June 2003 Coinciding with the Mid-Range Sonar Exercises of the USS Shoup 53-55 (2004) (conclusions unchanged in final report). Unfortunately, according to the report, freezer artifacts and other problems incidental to the preservation of tissue samples made the cause of death in most specimens difficult to determine; but the role of acoustic trauma could not be ruled out. Id.

(8) Kauai 2004 – During the Navy's conduct of a major training exercise off Hawaii, called RIMPAC 2004, some 150-200 whales from a species that is rarely seen near shore and had never naturally mass-stranded in Hawaii came into Hanalei Bay, on the island of Kaua'i. The whales crowded into the shallow bay waters and milled there for over 28 hours. Though the whales were ultimately assisted into deeper waters by members of a local stranding network, one whale calf was left behind and found dead the next day. NMFS undertook an investigation of the incident and concluded that the Navy's nearby use of sonar in RIMPAC 2004 was the "plausible, if not likely" cause of the stranding.[44]

(9) Canary Islands 2004 – In July 2004, four dead beaked whales were found around the coasts of the Canary Islands, within one week of an NATO exercise. The exercise, Majestic Eagle 2004, was conducted approximately 100 kilometers north of the Canaries. Although the three whale bodies that were necropsied were too decomposed to allow detection of gas embolisms (see below), systematic fat embolisms were found in these animals.[45] The probability that the whales died at sea is extremely high.[46]

(10) North Carolina 2005 – During and just after a U.S. training exercise off North Carolina, at least thirty-seven whales of three different species stranded and died along the Outer Banks, including numerous pilot whales (six of which were pregnant), one newborn minke whale, and two dwarf sperm whales. NMFS investigated the incident and found that the event was highly unusual, being the only mass stranding of offshore species ever to have been reported in the region, and that it shared 'a number of features' with other sonar-related mass stranding events (involving offshore species which stranded alive and were atypically distributed along the shore). NMFS concluded that sonar was a possible cause of the strandings and also ruled out the most common other potential causes, including viral, bacterial, and protozoal infection, direct blunt trauma, and fishery interactions.[47]

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[44] B.L. Southall, R. Braun, F.M.D. Gulland, A.D. Heard, R.W. Baird, S.M. Wilkin, and T.K. Rowles, Hawaiian Melon-Headed Whale (Peponacephala electra) Mass Stranding Event of July 3-4, 2004 (2006) (NOAA Tech. Memo. NMFS-OPR-31).

[45] A. Espinosa, M. Arbelo, P. Castro, V. Martín, T. Gallardo, and A. Fernández, New Beaked Whale Mass Stranding in Canary Islands Associated with Naval Military Exercises (Majestic Eagle 2004) (2005) (poster presented at the European Cetacean Society Conference, La Rochelle, France, April 2005); A. Fernández, M. Méndez, E. Sierra, A. Godinho, P. Herráez, A. Espinosa de los Monteros, F. Rodríguez, F., and M. Arbelo, M., New Gas and Fat Embolic Pathology in Beaked Whales Stranded in the Canary Islands (2005) (poster presented at the European Cetaecan Society Conference, La Rochelle, France, April 2005).

[46] Id.

[47] A.A. Hohn, D.S. Rotstein, C.A. Harms, and B.L. Southall, Multispecies Mass Stranding of Pilot Whales (Globicephala macrorhynchus), Minke Whale (Balaenoptera acutorostrata), and Dwarf Sperm Whales (Kogia sima) in North Carolina on 15-16 January 2005 (2006) (NOAA Tech. Memo. NMFS-SEFSC-53).

(11) Spain 2006 – Four Cuvier's beaked whales stranded on the Almerian coast of southern Spain, with the same suite of bends-like pathologies seen in the whales that stranded in the Canary Islands in 2002 and 2004.[48] A NATO response force was performing exercises within 50 miles at the time of the strandings. DEIS at E-24 to E-25.

Some preliminary observations can be drawn from these incidents. For example, beaked whales, a group of deep-water species that are seldom seen and may in some cases be extremely rare, seem to be particularly vulnerable to the effects of active sonar. A 2000 review undertaken by the Smithsonian Institution, and reported and expanded by the IWC's Scientific Committee and other bodies, supports this conclusion, finding that every mass stranding on record involving multiple species of beaked whales has occurred with naval activities in the vicinity.[49] Indeed, it is not even certain that some beaked whale species naturally strand in numbers.

But the full magnitude of sonar's effects on these species—or on other marine mammals—is not known. Most of the world lacks networks to identify and investigate stranding events, particularly those that involve individual animals spread out over long stretches of coastline, and therefore the mortalities that have been identified thus far are likely to represent only a subset of a substantially larger problem. For example, most beaked whale casualties (according to NMFS) are bound to go undocumented because of the remote siting of sonar exercises and the small chance that a dead or injured animal would actually strand.[50] It is well understood in terrestrial ecology that dead and dying animals tend to be grossly undercounted given their rapid assimilation into the environment, and one would of course expect profound difficulty where offshore marine species are concerned.[51] Along the eastern seaboard and in the Gulf of Mexico, all beaked whale sightings during NMFS shipboard surveys have occurred at considerable distances from shore.[52]

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[48] International Whaling Commission, Report of the Scientific Committee, Annex K at 28 (2006) (IWC/58/Rep1).

[49] Marine Mammal Program of the National Museum of Natural History, Historical Mass Mortalities of Ziphiids 2-4 (Apr. 6, 2000); see also 2 J. Cetacean Res. & Mgmt., Supp., Annex J at § 13.8 (2000) (report of the IWC Scientific Committee, Standing Working Group on Environmental Concerns).

[50] J.V. Carretta, K.A. Forney, M.M. Muto, J. Barlow, J. Baker, and M. Lowry, U.S. Pacific Marine Mammal Stock Assessments: 2006 (2007).

[51] See, e.g., G. Wobeser, Investigation and Management of Disease in Wild Animals 13-15 (1994); P.A. Alison, C.R. Smith, H. Kukert, J.W. Deming, B.A. Bennett, Deep-Water Taphonomy of Vertebrate Carcasses: A Whale Skeleton in the Bathyal Santa Catalina Basin, 17 Paleobiology 78-89 (1991).

[52] G.T. Waring, E. Josephson, C.P. Fairfield, and K. Maze-Foley, eds., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments—2006 at 232-33, 238, 288, 292, 296 (2007) (NOAA Tech. Memo. NMFS NE 201) (data from NMFS surveys, showing all beaked whales sightings at significant distances from shore).

Furthermore, although the physical process linking sonar to strandings is not perfectly understood, the record indicates that debilitating and very possibly lethal injuries are occurring in whales exposed to sonar at sea—only some of which may then strand. As first reported in the journal *Nature*, animals that came ashore during sonar exercises off the Canary Islands, in September 2002, had developed large emboli in their organ tissue and suffered from symptoms resembling those of severe decompression sickness, or "the bends."[53] It has been proposed that the panic led them to surface too rapidly or because it pushed them to dive before they could eliminate the nitrogen accumulated on previous descents, or because the sound itself precipitated the growth of nitrogen bubbles in the blood, which expanded to devastating effect. This finding has since been supported by follow-on papers, by published work in other fields, and by expert reviews.[54] In any case, the evidence is considered "compelling" that acoustic trauma, or injuries resulting from behavioral responses, has in some way led to the deaths of many of these animals.[55]

In this light, the Navy's assessment of the risk of marine mammal injury and mortality is astonishingly poor. Despite the presence of several beaked whale species, including Cuvier's beaked whales, within the exercise area, the DEIS assumes away the potential for strandings and injuries of beaked whales.

In its analysis, the Navy capriciously (1) denies the potential for beaked whale mortalities during the myriad training and testing activities proposed for the AFAST study area; (2) dismisses the potential for sonar to injure whales at sea, grossly mischaracterizing the literature; (3) suggests that beaked whale mortality cannot occur absent five contributory factors present during the Bahamas 2000 mass strandings in the Bahamas; (4) fails to consider the potential for strandings and mortalities in other species of cetaceans; and (5) assumes that the Navy's failure to observe mortalities during past sonar training is probative of a lack of mortalities, despite the lack of any remotely adequate monitoring system. As we have previously noted, NMFS' own analysis is problematic primarily in its conclusions about the injury threshold and in its treatment of the potential for injury at sea (71 Fed. Reg. 20995, 21002), which do not reflect the best available science and violate

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[53] See P.D. Jepson, M. Arbelo, R. Deaville, I.A.P. Patterson, P. Castro, J.R. Baker, E. Degollada, H.M. Ross, P. Herráez, A.M. Pocknell, F. Rodríguez, F.E. Howie, A. Espinosa, R.J. Reid, J.R. Jaber, V. Martín, A.A. Cunningham, A. Fernández, Gas-Bubble Lesions in Stranded Cetaceans, 425 Nature 575-576 (2003); Fernández et al., 'Gas and Fat Embolic Syndrome', 42 Veterinary Pathology at 415.

[54] Cox et al., Understanding the Impacts. For additional papers, see also the studies referenced at section II(B)(1)(a) ("Injury Threshold"). Of course it would be a mistake to assume that an animal must suffer bends-like injury or some other sort of acoustic trauma in order to strand. Some may die simply because the noise disorients them, for instance. See, e.g., NMFS, Assessment of Acoustic Exposures at 9-10.

[55] Cox et al., Understanding the Impacts; see also P.G.H. Evans and L.A. Miller, Concluding Remarks, in Proceedings of the Workshop on Active Sonar and Cetaceans 74 (2004); K.C. Balcomb and D.E. Claridge, A Mass Stranding of Cetaceans Caused by Naval Sonar in the Bahamas, 8(2) Bahamas Journal of Science 1 (2001); D.E. Claridge, Fine-Scale Distribution and Habitat Selection of Beaked Whales (2006) (M.Sc. thesis).

NEPA. 42 C.F.R. § 1502.22 (requiring agencies to evaluate all "reasonably foreseeable" impacts).

3. Modeling of Acoustic Impacts

The Navy bases its calculation of marine mammal impacts on a series of models that determine received levels of sound within a limited distance of a sonar array and then estimate the number of animals that would therefore suffer injury or disruption. It is difficult to fully gauge the accuracy and rigor of these models with the paucity of information that the DEIS provides; but even from the description presented here, it is clear that they are deeply flawed. Among the non-conservative assumptions that are implicit in the model:

(1) As discussed above, the thresholds established for injury, hearing loss, and significant behavioral change are inconsistent with the available data and are based, in part, on assumptions not acceptable within the field.

(2) The Navy does not properly account for reasonably foreseeable reverberation effects (as in the Haro Strait incident),[56] giving no indication that its modeling sufficiently represents areas in which the risk of reverberation is greatest;

(3) The model fails to consider the possible synergistic effects of using multiple sources, such as ship-based sonars, in the same exercise, which can significantly alter the sound field, and fails to consider the combined effects of multiple exercises, which, as NMFS indicates, may have played a role in the 2004 Hanalei Bay strandings;[57]

(4) In assuming animals are evenly distributed, the model fails to consider the magnifying effects of social structure, whereby impacts on a single animal within a pod, herd, or other unit may affect the entire group;[58]

(5) The Navy's analysis of marine mammal distribution, abundance, population structure, and ecology contains false assumptions that tend to underestimate impacts on species; and

(6) The model, in assuming that every whale encountered during subsequent exercises is essentially a new whale, does not address cumulative impacts on the breeding, feeding, and other activities of species and stocks.

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[56] NMFS, Assessment of Acoustic Exposures on Marine Mammals in Conjunction with USS Shoup Active Sonar Transmissions in the Eastern Strait of Juan de Fuca and Haro Strait, Washington, 5 May 2003 (2005).

[57] Southall et al., Hawaii Melon-Headed Whale at 31, 45.

[58] The effects of this deficiency are substantially increased by the Navy's use of a risk function, rather than an absolute threshold, to estimate Level B harassment.

The Navy's main source for information about marine mammal populations in the AFAST study area is its Marine Resource Assessments; but as these are secondary sources, it is generally difficult to assess which primary reference was used to support the Navy's analysis and whether it in fact constitutes the best available scientific evidence. Where references are offered in the DEIS, many appear to be more than 10 years old, predating increased sighting effort and data routinely available to take reduction teams. This sometimes results in inadequate or inaccurate depiction of habitat use and, consequently, inappropriate characterization of risk. For example:

(1) North Atlantic right whale: (a) The Navy appears to understate the degree to which right whales are present in New England waters during the winter months. See DEIS at 3-34. In fact, data from NMFS' right whale sightings advisory system ("SAS") show right whales off New England in virtually every month of the year, with considerable numbers of sightings throughout the winter.[59] Within the past year, passive acoustic monitoring buoys have documented almost daily use of Stellwagen Bank and of waters in and around critical habitat in the Great South Channel, in virtually all areas where buoys have been placed; and SAS data show right whales in both Cape Cod and the Great South Channel throughout the winter months, and significant concentrations around and to the north of Jeffrey's Ledge through late fall and into winter.[60] (b) Contrary to the Navy's assumptions, the SAS reports sightings of right whales in the mid-Atlantic through the spring and even into late summer.[61] (c) The Navy mischaracterizes the waters of George and Florida as the only area in which right whales birth their calves. In fact, with expanded survey effort, sightings in recent years suggest that the calving grounds extend off northern Georgia and South Carolina and possibly as far north as Cape Fear.[62] (d) In general, the sources cited on right whales date largely from the 1980s, and much of the information is outdated and incomplete or incorrect. More recent sources of information, including NMFS' own SAS data and Baumgartner and Mate's tagging study (which indicates a wider summertime use of the Gulf of Maine and the mid-Atlantic than represented in the Navy's

[59] NMFS, Right Whale Sightings Advisory System (SAS): Sightings/Detections 1997-2008 (undated) (available at whale.wheelock.edu/whalenet-stuff/reportsRW_NE).

[60] Id.; NMFS, Right Whale Sightings Advisory System (SAS): Right Whales Detected during 2008 (2008) (available at www.nefsc.noaa.gov/rwhale).

[61] Id.

[62] Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments—2006 (2007). Given that the Navy cites Waring et al. to document other right whale movements (e.g., to Iceland), it is unclear why the stock assessment was not also used to inform risk from activities that may occur in calving areas outside critical habitat.

modeling), present a more complex picture of habitat use than the DEIS assumes.[63] The risk to right whales are likely to have been underestimated.

(2) Other baleen whale species: For species that are subjects of commercial whale watching, observed concentrations are often merely an artifact of concentrated sightings efforts—a complication that may lead to a mischaracterization of the true distribution. For example, the Navy states that "important habitat for fin whales is located in the western Gulf of Maine, including Jeffreys Ledge and Stellwagen Bank, to the Great South Channel, in waters with a bottom depth of approximately 90 meters." DEIS at 3-54. While fin whales are found in these areas, they are also (and not just coincidentally) the outer reaches of the range of commercial whale-watch boats. By contrast, additional sightings effort also reveals fin whales and other baleen whales using offshore basins and ledges that are not enumerated in the DEIS. For example, a 2008 review of environmental impacts done for the Northeast Gateway LNG project included Cashes Ledge, Platts Bank, and Jeffreys Ledge within high-use summer habitat for fin whales and Jeffreys Ledge, Porpoise Basin, Georges Basin, and northern Georges Bank within "high abundance" winter habitat. 73 Fed. Reg. 16268. There is no reason for the limited presentation of information on distribution of fin whales, minke whales, and other species when information is readily available and used by corporate project proponents.

(3) Beaked whales: By grouping at least four beaked whale species into the single genus of mesoplodon (DEIS at 3-65), the Navy has understated risk to individual populations. Remarkably, the Navy exacerbates the problem by lumping Cuvier's beaked whale in the same group, even though NMFS distinguishes between this species and the mesoplodonts in its Atlantic and Gulf of Mexico stock assessments. Even if abundance estimates are not available for mesoplodonts, the Navy has made no effort to account for smaller populations in assessing the significance of impacts on species whose acute sensitivity to the Navy's activities is acknowledged. Notably, NMFS' most recent stock assessments consider beaked whales in the Atlantic and Gulf of Mexico to be strategic stocks "because of uncertainty regarding stock size and evidence of human induced mortality and serious injury associated with acoustic activities."[64]

(4) Pilot whales: As with beaked whales, the Navy treats the two pilot whale species present in the AFAST study area—long-finned and short-finned

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[63] M. Baumgartner and B. Mate, Summer and Fall Habitats of North Atlantic Right Whales (Eubalaena glacialis) Inferred from Satellite Telemetry, 62 Canadian Journal of Fisheries and Aquatic Science 527-43 (2005).

[64] Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments—2006 at 236, 242, 290, 294. The Gulf of Mexico stock of Cuvier's beaked whales is considered a strategic stock purely on the basis of "evidence of human induced mortality and serious injury associated with acoustic activities." Id. at 290.

pilot whales—as though they were a single species. Apparently, bycatch and genetic data provided to the Atlantic Trawl Gear Take Reduction Team and Atlantic Pelagic Longline Take Reduction Team, which are convened pursuant to the Marine Mammal Protection Act to address bycatch mortality, have not been incorporated in the species summaries, although these data can be used to delineate the distributions of each species.

(5) Other small cetaceans: As with pilot whales, the DEIS does not consider data presented to take reduction teams for various Atlantic stocks of odontocetes, including common dolphins, Rissos dolphins, and white-side dolphins. Again, these data are important for understanding patterns of offshore distribution in the Atlantic. In addition, the Navy has not incorporated the latest information on bycatch and mortality events in its discussion of various marine mammal populations. For example, the Atlantic stock of harbor porpoise—which the Navy recognizes to be a highly sensitive species—is experiencing increasing levels of fishery-related mortality throughout its range, with bycatch exceeding Potential Biological Removal (PBR) each year since 2004.[65] NMFS' draft stock assessment for 2007 lists harbor porpoises as a strategic stock and revises its abundance estimate and Potential Biological Removal downward; and NMFS re-convened its take reduction team as a result of concerns over high and increasing levels of bycatch of this species.[66] It is difficult to see how the estimated take of harbor porpoises under the Navy's no-action alternative can so easily be dismissed as insignificant.

4. Other Impacts on Marine Mammals

As the Navy's conceptual impact model suggests, the training and testing activities proposed for the AFAST study area can have impacts that are not limited to the overt physiological and behavioral effects of ocean noise. Unfortunately, the Navy's analysis of most of these other impacts is cursory and inadequate.

(1) The Navy fails to adequately assess the impact of "stress" on marine mammals, a serious problem for animals exposed even to moderate levels of sound for extended periods.[67] As the Navy has previously observed, stress from ocean noise—alone or in combination with other stressors, such as biotoxins—may weaken a cetacean's immune system, making it "more vulnerable to parasites and diseases that normally would not be fatal."[68] And one might add,

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[65] See, e.g., id. at 100-14

[66] NMFS, Draft 2007 Stock Assessments (2008) (available at www.nmfs.noaa.gov/pr/pdfs/sars/ao2007_draft.pdf).

[67] See National Research Council, Ocean Noise and Marine Mammals.

[68] Navy, Hawaii Range Complex Draft Environmental Impact Statement/ Overseas Environmental Impact Statement at 5-19 to 5-20 (2007). Additional evidence relevant to the problem of stress in marine mammals is summarized in A.J. Wright, N. Aguilar Soto, A.L. Baldwin, M. Bateson, C.M. Beale, C.Clark, T. Deak, E.F. Edwards, A. Fernández, A. Godinho, L. Hatch, A. Kakuschke, D. Lusseau, D.

following studies on terrestrial mammals, that chronic noise can interfere with brain development, increase the risk of myocardial infarctions, depress reproductive rates, cause malformations and other defects in young—all at moderate levels of exposure.[69] Because physiological stress responses are highly conservative across species, it is reasonable to assume that marine mammals would be subject to the same effects, particularly—as appears to be the case here—if they are resident animals exposed repeatedly to a variety of stressors in the AFAST study area. Yet despite the potential for stress in marine mammals and the significant consequences that can flow from it, the Navy assumes that such effects would be minimal. We note that substantial work on noise-related "stress" in marine mammals is shortly to be published, and we encourage the Navy to revise its DEIS accordingly.

(2) The Navy fails to consider the risk of ship collisions with large cetaceans, which is only exacerbated by the use of active acoustics. As noted below, right whales have been shown to engage in dramatic surfacing behavior, increasing their vulnerability to ship strikes, on exposure to mid-frequency alarms above 133 dB re 1 μPa (SPL)—a level of sound that can occur many tens of miles away from the sonar systems slated for the range.[70] It should be assumed that other large whales are subject to the same hazard.

(3) In the course of its activities, the Navy would release a host of toxic chemicals into the marine environment that could pose a threat to local wildlife over the life of the range. Nonetheless, while there is some brief discussion of potential impacts on human health and safety, the DEIS generally fails to consider the cumulative impacts of these toxins on marine mammals, from past, current, and proposed exercises. Careful study is needed into the way they might disperse and circulate around the islands and how they may affect marine wildlife. The Navy's analysis of hazardous materials is therefore incomplete.

(4) Finally, the Navy's analysis cannot be limited only to direct effects, i.e., effects that occur at the same time and place as the exercises that would be

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Martineau, L.M. Romero, L. Weilgart, B. Wintle, G. Notarbartolo di Sciara, and V. Martin, "Do marine mammals experience stress related to anthropogenic noise?" (in press and forthcoming 2008); see also T.A. Romano, M.J. Keogh, C. Kelly, P. Feng, L. Berk, C.E. Schlundt, D.A. Carder, and J.J. Finneran, Anthropogenic Sound and Marine Mammal Health: Measures of the Nervous and Immune Systems Before and After Intense Sound Exposure, 61 Canadian Journal of Fisheries and Aquatic Sciences 1124, 1130-31 (2004).

[69] See, e.g., E.F. Chang and M.M. Merzenich, Environmental Noise Retards Auditory Cortical Development, 300 Science 498 (2003) (rats); S.N. Willich, K. Wegscheider, M. Stallmann, and T. Keil, Noise Burden and the Risk of Myocardial Infarction, European Heart Journal (2005) (Nov. 24, 2005) (humans); F.H. Harrington and A.M. Veitch, Calving Success of Woodland Caribou Exposed to Low-Level Jet Fighter Overflights, 45 Arctic vol. 213 (1992) (caribou).

[70] Nowacek et al., North Atlantic Right Whales, 271 Proceedings of the Royal Society of London, Part B: Biological Sciences at 227.

authorized. See id. § 1508.8(a). It must also take into account the activity's indirect effects, which, though reasonably foreseeable (as the DEIS acknowledges), may occur later in time or at a farther remove. See id. § 1508.8(b). This requirement is particularly critical in the present case given the potential of sonar exercises to cause significant long-term impacts not clearly observable in the short or immediate term (a serious problem, as the National Research Council has observed).[71] Thus, for example, the Navy must not only evaluate the potential for mother-calf separation but also the potential for indirect effects—on survivability—that might arise from that transient change. 42 C.F.R. § 1502.16(b).

B. Impacts on Fish and Fisheries

Though the architecture of their ears may differ, fish are equipped, like all vertebrates, with thousands of sensory hair cells that vibrate with sound; and a number of specialized organs like the abdominal sac, called a "swim bladder," that some species possess can boost hearing. Fish use sound in many of the ways that marine mammals do: to communicate, defend territory, avoid predators, and, in some cases, locate prey.[72]

One series of recent studies showed that passing airguns can severely damage the hair cells of fish (the organs at the root of audition) either by literally ripping them from their base in the ear or by causing them to "explode."[73] Fish, unlike mammals, are thought to regenerate hair cells, but the pink snapper in these studies did not appear to recover within approximately two months after exposure, leading researchers to conclude that the damage was permanent.[74] It is not clear which elements of the sound wave contributed to the injury, or whether repetitive exposures at low amplitudes or a few exposures at higher pressures, or both, were responsible.[75] As with marine mammals, sound has also been shown to induce temporary hearing loss in fish. Even at fairly moderate levels, noise from outboard motor engines is capable of temporarily deafening some species of fish, and other sounds have been shown to affect the short-term hearing of a number of other

[71] "Even transient behavioral changes have the potential to separate mother-offspring pairs and lead to death of the young, although it has been difficult to confirm the death of the young." National Research Council, Ocean Noise and Marine Mammals at 96.

[72] See, e.g., A.N. Popper, Effects of Anthropogenic Sounds on Fishes, 28(10) Fisheries 26-27 (2003); M.C. Hastings & A.N. Popper, Effects of Sound on Fish 19 (2005) (Report to the California Department of Transportation, Contract No. 43A0139), p., 19; D.A. Croll, Marine Vertebrates and Low Frequency Sound—Technical Report for LFA EIS 1-90 (1999).

[73] R. McCauley, J. Fewtrell, and A.N. Popper, High Intensity Anthropogenic Sound Damages Fish Ears, 113 Journal of the Acoustical Society of America 640 (2003).

[74] Id. at 641 (some fish in the experimental group sacrificed and examined 58 days after exposure).

[75] Id.

species, including sunfish and tilapia.[76] For any fish that is dependent on sound for predator avoidance and other key functions, even a temporary loss of hearing (let alone the virtually permanent damage seen in snapper) will substantially diminish its chance of survival.[77]

Nor is hearing loss the only effect that ocean noise can have on fish. For years, fisheries in various parts of the world have complained about declines in their catch after intense acoustic activities (including naval exercises) moved into the area, suggesting that noise is seriously altering the behavior of some commercial species.[78] A group of Norwegian scientists attempted to document these declines in a Barents Sea fishery and found that catch rates of haddock and cod (the latter known for its particular sensitivity to low-frequency sound) plummeted in the vicinity of an airgun survey across a 1600-square-mile area, an area three times the size of the proposed USWTR range and larger than the state of Rhode Island; in another experiment, catch rates of rockfish were similarly shown to decline.[79] Drops in catch rates in these experiments range from 40 to 80 percent.[80] A variety of other species, herring, zebrafish, pink snapper, and juvenile Atlantic salmon, have been observed to react to various noise sources with acute alarm.[81]

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[76] A.R. Scholik and H.Y. Yan, Effects of Boat Engine Noise on the Auditory Sensitivity of the Fathead Minnow, Pimephales promelas, 63 Environmental Biology of Fishes 203-09 (2002); A.R. Scholik and H.Y. Yan, The Effects of Noise on the Auditory Sensitivity of the Bluegill Sunfish, Lepomis macrochirus, 133 Comparative Biochemisty and Physiology Part A at 43-52 (2002); M.E. Smith, A.S. Kane, & A.N. Popper, Noise-Induced Stress Response and Hearing Loss in Goldfish (Carassius auratus), 207 Journal of Experimental Biology 427-35 (2003); Popper, Effects of Anthropogenic Sounds at 28.

[77] See Popper, Effects of Anthropogenic Sounds at 29; McCauley et al., High Intensity Anthropogenic Sound Damages Fish Ears, at 641.

[78] See "'Noisy' Royal Navy Sonar Blamed for Falling Catches," Western Morning News, Apr. 22, 2002 (sonar off the U.K.); Percy J. Hayne, President of Gulf Nova Scotia Fleet Planning Board, "Coexistence of the Fishery & Petroleum Industries," www.elements.nb.ca/theme/fuels/percy/hayne.htm (accessed May 15, 2005) (airguns off Cape Breton); R.D. McCauley, J. Fewtrell, A.J. Duncan, C. Jenner, M.-N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch, and K. McCabe, Marine Seismic Surveys: Analysis and Propagation of Air-Gun Signals, and Effects of Air-Gun Exposure on Humpback Whales, Sea Turtles, Fishes, and Squid 185 (2000) (airguns in general).

[79] A. Engås, S. Løkkeborg, E. Ona, and A.V. Soldal, Effects of Seismic Shooting on Local Abundance and Catch Rates of Cod (Gadus morhua) and Haddock (Melanogrammus aeglefinus), 53 Canadian Journal of Fisheries and Aquatic Sciences 2238-49 (1996); J.R. Skalski, W.H. Pearson, and C.I. Malme, Effects of Sound from a Geophysical Survey Device on Catch-Per-Unit-Effort in a Hook-and-Line Fishery for Rockfish (Sebastes spp.), 49 Canadian Journal of Fisheries and Aquatic Sciences 1357-65 (1992). See also S. Løkkeborg and A.V. Soldal, The Influence of Seismic Exploration with Airguns on Cod (Gadus morhua) Behaviour and Catch Rates, 196 ICES Marine Science Symposium 62-67 (1993).

[80] Id.

[81] See J.H.S. Blaxter and R.S. Batty, The Development of Startle Responses in Herring Larvae, 65 Journal of the Marine Biological Association of the U.K. 737-50 (1985); F.R. Knudsen, P.S. Enger, and O. Sand, Awareness Reactions and Avoidance Responses to Sound in Juvenile Atlantic Salmon, Salmo salar L., 40 Journal of Fish Biology 523-34 (1992); McCauley et al., Marine Seismic Surveys at 126-61.

In their comments on the Navy's DEIS for the proposed Undersea Warfare Training Range, off North Carolina, several fishermen and groups of fishermen independently reported witnessing sharp declines in catch rates of various species when in the vicinity of Navy exercises.[82] These reports are indicative of behavioral changes, such as a spatial redistribution of fish within the water column, that could affect marine mammal foraging as well as human fisheries. In addition, as NMFS itself has observed, the use of mid-frequency sonar could affect the breeding behavior of certain species, causing them, for example, to cease their spawning choruses, much as certain echolocation signals do.[83] The repetitive use of sonar and other active acoustics could have significant adverse behavioral effects on some species of fish and those who depend on them.

Finally, high mortalities from noise exposure are seen in developmental stages of fish. A number of studies, including one on non-impulsive noise, show that intense sound can kill eggs, larvae, and fry outright or retard their growth in ways that may hinder their survival later.[84] Significant mortality for fish eggs has been shown to occur at distances of 5 meters from an airgun source; mortality rates approaching 50 percent affected yolksac larvae at distances of 2 to 3 meters.[85] Also, larvae in at least some species are known to use sound in selecting and orienting toward settlement sites.[86] Acoustic disruption at that stage of development could have significant consequences.[87]

The Navy capriciously dismisses the potential for significant adverse impacts on fish. First, while admitting that mid-frequency sonar can cause significant injury at distances of hundreds of feet, and having previously noted (with reference to Norwegian studies) that "some sonar levels have been shown to be powerful enough to cause injury to particular size classes of juvenile herring from the water's surface

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[82] See comments compiled by the Navy and posted on the Undersea Warfare Training Range EIS site.

[83] Letter from Miles M. Croom, NMFS Southeast Regional Office, to Keith Jenkins, Navy (Jan. 31, 2006); see also J.J. Luczkovich, "Potential Impacts of the U.S. Navy's Proposed Undersea Warfare Training Range on Fishes" (2006) (presentation to Navy).

[84] See, e.g., C. Booman, J. Dalen, H. Leivestad, A. Levsen, T. van der Meeren, and K. Toklum, Effecter av luftkanonskyting på egg, larver og yngel (Effects from Airgun Shooting on Eggs, Larvae, and Fry), 3 Fisken og Havet 1-83 (1996) (Norwegian with English summary); J. Dalen and G.M. Knutsen, Scaring Effects on Fish and Harmful Effects on Eggs, Larvae and Fry by Offshore Seismic Explorations, in H.M. Merklinger, Progress in Underwater Acoustics 93-102 (1987); A. Banner and M. Hyatt, Effects of Noise on Eggs and Larvae of Two Estuarine Fishes, 1 Transactions of the American Fisheries Society 134-36 (1973); L.P. Kostyuchenko, Effect of Elastic Waves Generated in Marine Seismic Prospecting on Fish Eggs on the Black Sea, 9 Hydrobiology Journal 45-48 (1973).

[85] Booman et al., Effecter av luftkanonskyting på egg, larver og yngel at 1-83.

[86] S.D. Simpson, M. Meekan, J. Montgomery, R. McCauley, R., and A. Jeffs, Homeward Sound, 308 Science 221 (2005).

[87] Popper, Effects of Anthropogenic Sounds at 27.

to the seafloor," [88] and even though the Navy will be operating at higher source levels than those used in the Norwegian studies (DEIS at 4-154), the Navy now claims that Atlantic and Gulf of Mexico populations would not suffer significant impacts. For this conclusion, it notes only that levels of mortality in Norway were considered small relative to natural daily mortality rates (DEIS at 4-157)—a conclusion that fails to take into account the Navy's higher source levels, the specific ecology of Atlantic and Gulf of Mexico fish populations, the potential for cumulative effects, and the differential impacts that activities in spawning areas may have.

Second, while admitting that mid-frequency noise can alter behavior, the DEIS argues that fish are less responsive to mid-frequency than to low- and high-frequency sounds. DEIS at 4-157. For this proposition, it improperly relies entirely on two studies on acoustic deterrent devices, otherwise known as "pingers": a technology used in some American fisheries to ward harbor porpoises and certain other marine mammals away from gillnets. DEIS at 4-156. Not only do the deterrents featured in the two papers differ from the Navy's mid-frequency tactical sonar, presenting a different wave form and operating at a source level literally billions of times less intense (130 dB versus 235 dB re 1 μPa); but, in at least one of the studies, it actually altered the behavior of the fish, drawing them into the gillnet for reasons that are not explored.[89] Further, the Navy dismisses a clearly relevant study of dolphin sounds and their impact on silver perch mating signals—a study that NMFS and state regulators have cited as reason for concern. DEIS at 4-156 to 157.

The Navy must rigorously analyze the potential for behavioral, auditory, and physiological impacts on fish, including the potential for population-level effects, using models of fish distribution and population structure and conservatively estimating areas of impact from the available literature. 42 C.F.R. § 1502.22.

Having concluded—without basis—that mid-frequency sonar would have no significant impact on fish and fish habitat, the Navy dismisses the notion that fisheries in the area would suffer economic loss (DEIS at 4-167), even though (judging by the comments from fishermen on the Navy's USWTR range) its activities appear to have disrupted fishing in the past. But, just as with the North Carolina range, the available evidence underscores the need for a more serious and informed analysis than the DEIS currently provides. The Navy must meaningfully

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[88] Navy, Hawaii Range Complex Draft Environmental Impact Statement/ Overseas Environmental Impact Statement at 4-15 (2007).

[89] B.M. Culik, S. Koschinski, N. Tregenza, and G.M. Ellis, Reactions of Harbor Porpoises Phocoena phocoena and Herring Clupea harengus to Acoustic Alarms, 211 Marine Ecology Progress Series 255, 258 (2001).

assess the economic consequences of reduced catch rates on commercial and recreational fisheries and on marine mammal foraging in the AFAST study area.[90]

C. Other Impacts on Marine Wildlife

The Navy's current and proposed activities pose risks to marine wildlife beyond ocean noise: injury or death from collisions with ships, bioaccumulation of toxins, and the like. Indeed, many of the same concerns that apply to marine mammals (and are discussed above) apply to fish, sea turtles, and other biota as well. The Navy must adequately evaluate impacts and propose mitigation for each category of harm. 42 C.F.R. §§ 1502.14, 1502.16.

D. Cumulative Impacts

In order to satisfy NEPA, an EIS must include a "full and fair discussion of significant environmental impacts." 40 C.F.R. § 1502.1. It is not enough, for purposes of this discussion, to consider the proposed action in isolation, divorced from other public and private activities that impinge on the same resource; rather, it is incumbent on the Navy to assess cumulative impacts as well, including the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future significant actions." Id. § 1508.7. Thus, for example, it is necessary to consider the impacts of the proposed exercise alongside those of other activities in the region, including industrial and commercial activities such as fishing, shipping, and coastal development.

As it stands, the Navy says little more than that all of the impacts from its thousands of annual hours of activity would necessarily be "short-term" in nature and therefore would not affect vital rates in individuals or populations. DEIS at 4-93 to 4-125, 6-62. The Navy also offers the bromide that mitigation will preclude any significant or long-term impacts on marine mammals and the marine environment. DEIS at 6-61. Not only are both statements factually insupportable given the lack of any population analysis or quantitative assessment of long-term effects in the document (and the

[90] Sea turtles are also effectively excluded from further analysis of acoustic impacts on the grounds that their best hearing range appears to occur below 1 kHz. DEIS at 4-139. But having their best acoustic sensitivity in this range does not mean that sea turtles are oblivious to noise at higher frequencies. Juvenile loggerheads, for example, have their best sensitivity at frequencies all the way up to 1 kHz, suggesting that they continue to detect sounds at higher levels, including potentially the lower end of the intense mid-frequency sources intended for the range. S.M. Bartol, J.A. Musick, and M. Lenhardt, Auditory Evoked Potentials of the Loggerhead Sea Turtle (Caretta caretta), 99 Copeia 836 (1999). Furthermore, they have been shown to engage in startle and escape behavior—behavior that may involve diving and surfacing—and to experience heightened stress in response to vessel noise, which receives no discussion in the DEIS. National Research Council, The Decline of Sea Turtles: Causes and Prevention (1990). Given these findings, and given that all of the sea turtles on the proposed sites belong to endangered or threatened populations, a more rigorous and conservative analysis of potential acoustic impacts is necessary, and areas of particular importance to sea turtles should be taken into consideration in the Navy's alternatives analysis.

numerous errors in the Navy's thresholds and modeling, discussed above)—but they misapprehend the definition of "cumulative impact," which, according to NEPA's regulations, "can result from individually minor but collectively significant actions taking place over a period of time." 42 C.F.R. § 1508.7.

More particularly, the Navy assumes—capriciously, for the reasons discussed above—that its thousands of hours of sonar activities will not result in the serious injury or death of even a single animal. DEIS at 6-66. It simply assumes all behavioral impacts are short-term in nature and cannot affect individuals or populations through repeated activity—even though its no-action alternative would produce, by the Navy's own estimates, approximately 2.75 million behavioral "takes" of marine mammals each year (DEIS at ES-23), which amounts to more than 13.75 million takes over a five-year MMPA authorization period.[91] And, while it states that behavioral harassment (aside from those caused by masking effects) involves a stress response that may contribute to an animal's allostatic load (DEIS at 4-23), it again assumes without further analysis that any such impacts would be "incremental, but recoverable." DEIS at 6-62.

Nor does the Navy consider the potential for acute synergistic effects from sonar training. For example, although the DEIS discusses the potential for ship strike in the study area, it does not consider the greater susceptibility to vessel strike of animals that have been temporarily harassed or disoriented by certain AFAST noise sources. The absence of analysis is particularly glaring in light of the 2004 Nowacek et al. study, which indicates that mid-frequency sources provoke surfacing and other behavior in North Atlantic right whales that increases the risk of vessel strike.[92] Nor does the Navy consider (for example) the synergistic effects of noise with other stressors in producing or magnifying a stress-response.[93] In short, the Navy's conclusion that cumulative and synergistic impacts from AFAST sonar training are insignificant cannot plausibly be supported.

All of these failures of analysis are reflected not only in the Navy's unsupported conclusions about the benignity of AFAST standing alone, but in its broader conclusions about human activities along the eastern seaboard and in the Gulf of Mexico. Generally, this chapter makes clear that the AFAST study area is crowded

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[91] In its discussion of cumulative impacts, the Navy states, inter alia, that its acoustic analysis estimates Level B harassment of "4,335,480 total marine mammals (including ESA-listed species)" under the No Action Alternative. DEIS at 6-65 (noting that this number represents takes rather than affected animals). This estimate appears inconsistent with the take estimates provided in Chapter 4 and summarized at ES-23, which indicate annual Level B harassment of approximately 2,750,000 takes under the same alternative. We request that the Navy clarify this seeming discrepancy.

[92] Nowacek et al., North Atlantic Right Whales, 271 Proceedings of the Royal Society of London, Part B: Biological Sciences at 227-31.

[93] A.J. Wright, N. Aguilar Soto, A.L. Baldwin, M. Bateson, C.M. Beale, C.Clark, T. Deak, E.F. Edwards, A. Fernández, A. Godinho, L. Hatch, A. Kakuschke, D. Lusseau, D. Martineau, L.M. Romero, L. Weilgart, B. Wintle, G. Notarbartolo di Sciara, and V. Martin, "Do marine mammals experience stress related to anthropogenic noise?" (in press and forthcoming 2008); see also other papers published in same volume.

with human activities, many of which introduce noise, chemical pollution, debris, and vessel traffic into the habitat of protected species. The idea that all of these events, when taken as a whole, are having at most "moderate, but recoverable, adverse effects" (see DEIS at 6-83) is, to say the least, implausible. Indeed, it is not just implausible, but incorrect: scientists generally consider the east coast of North America and the Gulf of Mexico to be degraded habitat for many species and this degradation has been caused by the cumulative impact of human activities. Given the scope of the proposed action, the deficiencies of the Navy's cumulative impacts assessment represent a critical failure of the DEIS.

E. Alternatives Analysis

At bottom, an EIS must "inform decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment." 40 C.F.R. § 1502.1. This requirement has been described in regulation as "the heart of the environmental impact statement." Id. § 1502.14. The agency must therefore "[r]igorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." Id. § 1502.14(a). Consideration of alternatives is required by (and must conform to the independent terms of) both sections 102(2)(C) and 102(2)(E) of NEPA.

First, the Navy declines to consider a reduction in the level of current training in the AFAST study area. Yet the Navy's assumption that exercises on the range must continue at their current tempo may well be an artifact of the Navy's Tactical Training Theater Assessment and Planning Program (TAP) process, which, in requiring separate environmental analysis of existing ranges and operating areas, seems to assume a priori that exercises cannot be reapportioned or alternative sites found. Moreover, the DEIS fails to analyze meaningfully whether a different mix of simulators and at-sea exercises would accomplish its aims. Instead, it rules out the increased use of simulators by stating, in a cursory few sentences, that they do not obviate the need for realistic training. But its summary treatment of this issue does not sufficiently justify the precise number of exercises that have been proposed. Alternatives that combine greater use of simulators with fewer open-water exercises—or that develop a plan to maximize use of synthetic training—should have been analyzed, not dismissed out of hand.

Second, Avoiding concentrations of vulnerable and endangered populations and high abundances of marine life is perhaps the most critical step the Navy can take in reducing impacts, and a "hard look" at geographical alternatives is plainly required by NEPA and other laws.[94] We are encouraged to see that the Atlantic Fleet, unlike the

[94] E.g., NRDC v. Evans, 279 F.Supp.2d at 1664-66; NRDC v. Navy, 857 F.Supp. at 734; T. Agardi, N.A. Soto, A. Cañadas, M. Engel, A. Frantzis, L. Hatch, E. Hoyt, K. Kaschner, E. LaBrecque, V. Martin, G. Notarbartolo di Sciara, G. Pavan, A. Servido, B. Smith, J.Y. Wang, L. Weilgart, B. Wintle, A.J. Wright, A Global Scientific Workshop on Spatio-Temporal Management of Noise 3 (2007).

Pacific, has attempted to develop geographic alternatives for sonar training; but the Navy's analysis is incomplete and the outcome is not justified.

(a) The Navy's refusal to adopt any meaningful geographic mitigation for the AFAST study area is unjustifiable and, indeed, outrageous.

(b) The Navy rules out Alternative 3 because the annual take numbers it implies are roughly comparable to those associated with the no-action alternative; but a closer examination of the numbers strongly suggests that the Navy's would-be "areas of increased awareness" were poorly chosen. For example, even though the Navy treats harbor porpoises as the most acoustically vulnerable of all marine mammal species, and even though the Atlantic stock of harbor porpoises is currently in decline, the DEIS has not identified "increased awareness" areas in such a way as to lower harbor porpoise take. A similar point may be made about North Atlantic right whales, even though many areas of high concentrations are known and critical habitat has been defined. In addition, there is no justification for why some areas along the shelf break and shoreward of the Gulf Stream are included while others are not, given the general productivity of these bathymetric and oceanographic features. The Navy must revisit Alternative 3 to heuristically identify areas whose exclusion would, indeed, effectively lower risks to vulnerable species and/or reduce the amount of overall take.

(c) In addition, Alternative 3 makes exceptions for certain biologically critical areas that it has identified for exclusion. For example, after acknowledging the importance of "reduce[ing] potential exposures of endangered right whales during their critical calving and feeding activities," the Navy goes on to allow certain exercises in established critical habitat, including TORPEX exercises in the foraging grounds in the northeast and tracking activities in the breeding grounds in the southeast. (With respect to North Atlantic right whales, we would also note that critical habitats are not the only areas important to the species and that seasonal concentrations of right whales are also found in nearby waters. See section B.3.) Similarly, the Navy would allow major carrier strike group exercises in DeSoto Canyon in the Gulf of Mexico. Despite the Navy's claims, we believe the Navy has no viable operational justification for use of many of these critical areas.

(d) For somewhat less critical areas, the Navy has not attempted to identify "increased awareness" areas for Alternative 3 (or use areas for Alternatives 1 and 2) by category of exercise. Such an analysis is necessary, since certain exercises presumably would have greater flexibility in their operational requirements than others.

Third, even aside from the omission of reasonable alternative locations, the Navy fails to consider alternatives of any other kind. While the question of proper siting is crucial, it is not the only factor that must be considered in identifying other, less harmful ways to fulfill the Navy's purpose. Indeed, it appears that many reasonable alternatives are missing from the Navy's analysis that might fulfill that purpose while reducing harm to marine life and coastal resources. For example, and as discussed at greater length below, the DEIS fails to include a range of mitigation measures among its alternatives.

Many such measures are employed by other countries in their sonar exercises and even by the U.S. Navy in other contexts; and there are many others that should be considered. Such measures are reasonable means of reducing harm to marine life and other resources within the AFAST study area, and their omission from the alternatives analysis renders that analysis inadequate.

Fourth, the Navy's statement of purpose and need contains no language that would justify the limited set of alternatives that the Navy considers (or the alternative it ultimately prefers). Yet it is a fundamental requirement of NEPA that agencies preparing an EIS specify their project's "purpose and need" in terms that do exclude full consideration of reasonable alternatives. 40 C.F.R. § 1502.13; City of Carmel-by-the-Sea v. United States Dep't of Transp., 123 F.3d 1142, 1155 (9th Cir. 1997) (citing Citizens Against Burlington, Inc. v. Busey, 938 F.2d 190, 196 (D.C. Cir. 1991)). "The existence of a viable but unexamined alternative renders an environmental impact statement inadequate," Idaho Conservation League v. Mumma, 956 F.2d 1508, 1519 (9th Cir. 1992), and an EIS errs when it accepts "as a given" parameters that it should have studied and weighed. Simmons v. U.S. Army Corps of Eng'rs, 120 F.3d 664, 667 (7th Cir. 1997).

In sum, the DEIS omits from its analysis reasonable alternatives—with regard to both the siting of the range and other operational choices—that might achieve the Navy's core aim while minimizing environmental harm. These omissions are all the more unreasonable given the long period during which the Navy has worked on this document and its predecessors. For these reasons, we urge the Navy to issue an EIS that adequately informs the public of all reasonable alternatives that would reduce adverse impacts to whales, fish, sea turtles, and other marine resources. 40 C.F.R. § 1502.1.

F. Mitigation Measures

To comply with NEPA, an agency must discuss measures designed to mitigate its project's impact on the environment. See 42 C.F.R. § 1502.14(f). There is a large and growing set of options for the mitigation of noise impacts to marine mammals and other marine life, some of which have been imposed by navies—and by the Navy itself, in other contexts—to limit harm from high-intensity sonar exercises. Yet here the Navy does little more than set forth a cribbed set of measures, falling short even of what other navies have implemented for transient exercises and providing no discussion on a variety of other options.

All of the mitigation that the Navy has proposed for acoustic impacts boils down to the following: a very small safety zone around the sonar vessel, maintained primarily with visual monitoring by onboard lookouts, with aid from non-dedicated aircraft (when in the vicinity) and passive monitoring (though the vessel's generic sonar system). Under the proposed scheme, which is virtually identical to that in the Navy's current national defense exemption under the MMPA, operators would power down the system by 6 dB if a marine mammal is detected within 1000 yards, power it down by 10 dB if the

protected species is detected within 500 yards, and shut it down if the animal is detected within 200 yards. DEIS at 5-5. Operators could resume operations at full levels when, inter alia, the vessel has transited 1000 yards, which, given vessel speeds during most ASW exercises, would literally take only a few minutes. It has been the pattern for the Navy to claw back mitigation with each new set of guidelines, and AFAST is no exception, reducing the safe transit distance in the current national defense exemption from 2000 to 1000 yards.[95]

This mitigation scheme disregards the best available science on the significant limits of that technique. Indeed, the species perhaps most vulnerable to sonar-related injuries, beaked whales, are among the most difficult to detect because of their small size and diving behavior. It has been estimated that in anything stronger than a light breeze, only one in fifty beaked whales surfacing in the direct track line of a ship would be sighted; as the distance approaches 1 kilometer, that number drops to zero.[96] The Navy's reliance on visual observation as the mainstay of its mitigation plan is therefore profoundly misplaced.

Moreover, the Navy's analysis ignores or improperly discounts an array of options that have been considered and imposed by other active sonar users, including avoidance of coastal waters, high-value habitat, and complex topography; the employment of a safety zone more protective than the 1000-yard power-down and 200-yard shutdown proposed by the Navy; general passive acoustic monitoring for whales; special rules for surfacing ducting and low-visibility conditions; monitoring and shutdown procedures for sea turtles and large schools of fish; and many others.[97] The Navy's conclusions are all the more remarkable given recent court decisions finding that the Navy can and must do more to reduce harm to protected species from sonar training. NRDC v. Winter, 527 F.Supp.2d 1216 (C.D. Cal. 2008), aff'd __ F.3d __, 2008 WL 565680 (9th Cir. 2008); Ocean Mammal Institute v. Gates, 2008 WL 564664 (D. Hawaii 2008).

Measures that the Navy should consider include, inter alia:

(1) Establishment of a coastal exclusion zone for acoustics training and testing, such as one for major exercises that would minimally run at least 25 nm from the 200 meter isobath, or beyond the shelf break and Gulf Stream, whichever is greater;

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[95] DEIS at 5-5; Deputy Secretary of Defense, National Defense Exemption from Requirements of the Marine Mammal Protection Act for Certain DoD Military Readiness Activities That Employ Mid-Frequency Active Sonar or Improved Extended Echo Ranging Sonobuoys at 2 (Jan. 23, 2007).

[96] J. Barlow and R. Gisiner, Mitigating, Monitoring, and Assessing the Effects of Anthropogenic Noise on Beaked Whales, 7 Journal of Cetacean Research and Management 239-249 (2006).

[97] See, e.g., Royal Australian Navy, "Maritime Activities Environmental Management Plan," Procedure S-1 and Planning Guide 16 (July 8, 2005); NATO Undersea Research Centre, Human Diver and Marine Mammal Risk Mitigation Rules and Procedures (2006) (NURC-SP-2006-008); ICES, Report of the Ad-hoc Group on the Impacts of Sonar on Cetaceans and Fish 33-36 (2005) (ICES CM 2005/ACE:06). The U.S. Navy has also used additional mitigation measures for various exercises in the past.

(2) Seasonal avoidance of North Atlantic right whale feeding grounds, calving grounds, and migration corridor;

(3) Avoidance of federal and state marine protected areas, including the national marine sanctuaries located along the eastern seaboard and in the Gulf of Mexico;

(4) Avoidance of bathymetry likely to be associated with high-value habitat for species of particular concern, including submarine canyons and large seamounts, or bathymetry whose use poses higher risk to marine species;

(5) Avoidance of fronts and other major oceanographic features, such as the Gulf Stream, warm core rings, and other areas with marked differentials in sea surface temperatures, which have the potential to attract offshore concentrations of animals, including beaked whales;[98]

(6) Avoidance of areas with higher modeled takes or with high-value habitat for particular species, many of which are indicated in the predictive habitat modeling undertaken for the DEIS (see DEIS App. D);

(7) Concentration of exercises to the maximum extent practicable in abyssal waters and in surveyed offshore habitat of low value to species;

(8) Use of sonar and other active acoustic systems at the lowest practicable source level, with clear standards and reporting requirements for different testing and training scenarios;

(9) Expansion of the marine species "safety zone" to a 4 km shutdown, reflecting international best practice, or 2 km, reflecting the standard prescribed by the California Coastal Commission and adopted in NRDC v. Winter, 527 F.Supp.2d 1216 (C.D. Cal. 2008), aff'd __ F.3d __, 2008 WL 565680 (9th Cir. 2008);[99]

(10) Suspension of relocation of exercises when beaked whales or significant aggregations of other species, such as melon-headed whales, are detected by any means within the orbit circle of an aerial monitor or near the vicinity of an exercise;

(11) Use of simulated geography (and other work-arounds) to reduce or eliminate chokepoint exercises in near-coastal environments, particularly within canyons and channels, and use of other important habitat;

(12) Avoidance or reduction of training during months with historical significant surface ducting conditions, and use of power-downs during significant surface ducting conditions at other times;

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[98] See, e.g., Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments—2006 at 233 (reporting recent results that suggest "beaked whale abundance may be highest in association with Gulf Stream and warm-core ring features").

[99] California Coastal Commission, Adopted Staff Recommendation on Consistency Determination CD-086-06 (2007); Approved Letter from M. Delaplaine, California Coastal Commission, to Rear Adm. Len Hering, Navy (Jan. 11, 2007).

(13) Use of additional power-downs when significant surface ducting conditions coincide with other conditions that elevate risk, such as during exercises involving the use of multiple systems or in beaked whale habitat;

(14) Planning of ship tracks to avoid embayments and provide escape routes for marine animals;

(15) Suspension or postponement of chokepoint exercises during surface ducting conditions and scheduling of such exercises during daylight hours;

(16) Use of dedicated aerial monitors during chokepoint exercises, major exercises, and near-coastal exercises;

(17) Use of dedicated passive acoustic monitoring to detect vocalizing species, through established and portable range instrumentation and the use of hydrophone arrays off instrumented ranges;

(18) Modification of sonobuoys for passive acoustic detection of vocalizing species;

(19) Suspension or reduction of exercises or power-down of sonar outside daylight hours and during periods of low visibility;

(20) Use of aerial surveys and ship-based surveys before, during, and after major exercises;

(21) Use of all available range assets for marine mammal monitoring;

(22) Use of third-party monitors for marine mammal detection;

(23) Establishment of long-term research, to be conducted through an independent agent such as the National Fish and Wildlife Foundation, on the distribution, abundance, and population structuring of protected species in the AFAST study area, with the goal of supporting adaptive geographic avoidance of high-value habitat;

(24) Application of mitigation prescribed by state regulators, by the courts, by other navies or research centers, or by the U.S. Navy in the past or in other contexts;

(25) Avoidance of fish spawning grounds and of important habitat for fish species potentially vulnerable to significant behavioral change, such as wide-scale displacement within the water column or changes in breeding behavior;

(26) Avoidance of high-value sea turtle habitat;

(27) Evaluating before each major exercise whether reductions in sonar use are possible, given the readiness status of the strike groups involved;

(28) Dedicated research and development of technology to reduce impacts of active acoustic sources on marine mammals;

(29) Establishment of a plan and a timetable for maximizing synthetic training in order to reduce the use of active sonar in Atlantic Fleet training;

(30) Prescription of specific mitigation requirements for individual classes (or sub-classes) of testing and training activities, in order to maximize mitigation given varying sets of operational needs; and

(31) Timely, regular reporting to NOAA, state coastal management authorities, and the public to describe and verify use of mitigation measures during testing and training activities.

Consideration of these measures is minimally necessary to satisfy the requirements of NEPA, and we note that similar or additional measures may be required under the Marine Mammal Protection Act, Endangered Species Act, and other statutes.

G. Project Description and Meaningful Public Disclosure

Disclosure of the specific activities contemplated by the Navy is essential if the NEPA process is to be a meaningful one. See, e.g., LaFlamme v. F.E.R.C., 852 F.2d 389, 398 (9th Cir. 1988) (noting that NEPA's goal is to facilitate "widespread discussion and consideration of the environmental risks and remedies associated with [a proposed action]").

With regard to noise-producing activities, for example, the Navy must describe source levels, frequency ranges, duty cycles, and other technical parameters relevant to determining potential impacts on marine life. The AFAST DEIS and its predecessors provide some of this information, indicating, for example, the nominal source level of the SQS-53 system, which is deployed on surface ships. But it fails to disclose sufficient information about helicopter dipping sonar, active sonobuoys, acoustic device countermeasures, training targets, or range sources that would be used during the exercise; and, even with respect to the SQS-53 system, refrains from giving any indication of platform speed, pulse length, repetition rate, beam widths, or operating depths—that is, most of the data that the Navy presumably used in modeling acoustic impacts. See DEIS at C-1 to C-13.

Just as important, the Navy—despite repeated requests—has not released or offered to release CASS/GRAB or any of the other modeling systems or functions it used to develop the biological risk function or calculate acoustic harassment and injury. See, e.g., DEIS at H-5 to H-6. These models must be made available to the public, including the independent scientific community, for public comment to be meaningful under NEPA and the Administrative Procedure Act. 42 C.F.R. §§ 1502.9(a), 1503.1(a) (NEPA); 5 U.S.C. § 706(2)(D) (APA). And guidelines adopted under the Data (or Information) Quality Act also require their disclosure. The Office of Management and Budget's guidelines require agencies to provide a "high degree of transparency" precisely "to facilitate reproducibility of such information by qualified third parties" (67 Fed. Reg. 8452, 8460 (Feb. 22, 2002)); and the Defense Department's own data quality guidelines mandate that "influential" scientific material be made reproducible as

well.[100] We encourage the Navy to contact us immediately to discuss how to make this critical information available.

H. Scope of Review

As a threshold issue, we are concerned about the Navy's understanding of its obligations under applicable law. The Navy indicates that its analysis of "extraterritorial" activities, those activities that would take place outside U.S. territorial waters, was prepared under the authority of Executive Order 12114 rather than under NEPA. See DEIS at 1-8. Not only is this position on the scope of review inconsistent with the statute (see, e.g., Environmental Defense Fund v. Massey, 968 F.2d 528 (D.C. Cir. 1994) and NRDC v. Navy, No. CV-01-07781, 2002 WL 32095131 at *9-12 (C.D. Cal. Sept. 19, 2002)), but, insofar as it represents a broader policy, it provides further indication that current operations off the east coast and Gulf of Mexico are likewise out of compliance. Most of area used for sonar training is sited beyond the 12nm territorial boundary, within the U.S. Exclusive Economic Zone. If, as we expect, activities currently taking place there have not received their due analysis in a prior environmental impact statement, then the Navy is operating in ongoing violation of NEPA.

I. Compliance with Other Applicable Laws

A number of other statutes and conventions are implicated by the proposed activities, considering their marine acoustic impacts alone. Among those that must be disclosed and addressed during the NEPA process are the following:

(1) The Marine Mammal Protection Act ("MMPA"), 16 U.S.C. § 1361 et seq., which requires the Navy to obtain a permit or other authorization from NMFS or the U.S. Fish and Wildlife Service prior to any "take" of marine mammals. The Navy has applied for an Incidental Harassment Authorization under the MMPA (see 73 Fed. Reg. 11889 (Mar. 5, 2008)), and NRDC will submit comments regarding the Navy's application to NMFS at the appropriate time.

(2) The Endangered Species Act, 16 U.S.C. § 1531 et seq., which requires the Navy to enter into formal consultation with NMFS or the U.S. Fish and Wildlife Service, and receive a legally valid Incidental Take Permit, prior to its "take" of any endangered or threatened marine mammals or other species, including fish, sea turtles, and birds, or its "adverse modification" of critical habitat. See, e.g., 1536(a)(2); Romero-Barcelo v. Brown, 643 F.2d 835 (1st Cir. 1981), rev'd on other

[100] Navy, Ensuring the Quality of Information Disseminated to the Public by the Department of Defense: Policy and Procedural Guidance § 3.2.3.1 (Feb. 10, 2003). The Defense Department defines "influential" to mean "that the Component can reasonably determine that dissemination of the information will have or does have clear and substantial impact on important public policies or important private sector decisions"—which is clearly the case here. See Ensuring the Quality of Information Disseminated to the Public by the Department of Defense: Definitions § 3 (Feb. 10, 2003).

grounds, Weinberger v. Romero-Carcelo, 456 U.S. 304, 313 (1982). The Navy must consult with the NMFS over blue whales, fin whales, humpback whales, North Atlantic right whales, sei whales, sperm whales, green sea turtles, Kemp's ridley sea turtles, olive ridley sea turtles, hawksbill sea turtles, leatherback sea turtles, loggerhead sea turtles, Bermuda petrels, gulf sturgeon, smalltooth sawfish, brown pelicans, least terns, and roseate terns, all of which are listed under the Act.

(3) The Coastal Zone Management Act, and in particular its federal consistency requirements, 16 U.S.C. § 1456(c)(1)(A), which mandate that activities that affect the natural resources of the coastal zone—whether they are located "within or outside the coastal zone"—be carried out "in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs." Remarkably, notwithstanding the comments of "several regulatory agencies" (see DEIS at 1-15) and at least one adverse federal court ruling, the Navy has declined to engage in consistency review both for certain states and certain of its activities. In the first place, although it has prepared consistency determinations for the states of Connecticut, Florida, Georgia, Texas, and Virginia (see DEIS App. F), these submissions appear to cover only those activities, like in-port testing, that actually occur within the state's coastal zone. See, e.g., DEIS at F-18 (consistency determination for Florida). This narrow approach plainly violates the CZMA's federal consistency requirements and, indeed, has already been rejected by the courts. NRDC v. Winter, 2007 WL 2481037 at *8-9 (C.D. Cal. 2007).

Second, the Navy has failed to prepare consistency determinations for at least some states whose coastal resources would be affected. Most notably, it promises to present a negative determination to North Carolina—even though hundreds of hours of sonar training would place off the coast of that state, in the Cherry Point Operating Area, and even though the enforceable policies of the state's coastal zone management program clearly demand it. See, e.g., 15A N.C.A.C. 07M .0701 (mandatory mitigation policy adopted pursuant to state's Coastal Area Management Act). It is discouraging to see the Atlantic Fleet repeat the same legal violations that the Navy has seen rejected in the Pacific. The Navy must fulfill its CZMA commitments.

(4) The Magnuson-Stevens Fisheries Conservation and Management Act, 16 U.S.C. § 1801 et seq. ("MSA"), which requires federal agencies to "consult with the Secretary [of Commerce] with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken" that "may adversely affect any essential fish habitat" identified under that Act. 16 U.S.C. § 1855 (b)(2). In turn, the MSA defines essential fish habitat as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." 16 U.S.C. § 1802 (10). The Atlantic Fleet's sonar training area contains such habitat. As discussed at length above, Anti-Submarine Warfare exercises alone have the significant potential to adversely affect at least the waters, and possibly the

substrate, on which fish in these areas depend. Under the MSA, a thorough consultation is required.

(5) The Marine Protection, Research and Sanctuaries Act, 33 U.S.C. § 1401 et seq., which requires federal agencies to consult with the Secretary of Commerce if their actions are "likely to destroy, cause the loss of, or injure any sanctuary resource." 16 U.S.C. § 1434(d)(1). The Navy indicates that it will not presently consult with any of the Sanctuaries within the AFAST region—not Stellwagen Bank, USS Monitor, Gray's Reef, Flower Garden, or Florida Keys National Marine Sanctuaries—even though none of these protected areas would be excluded under its preferred alternative. DEIS at 6-75. Since the Navy's exercises would cause injury and mortality of species, consultation is clearly required if sonar use takes place either within or in the vicinity of the sanctuaries or otherwise affects their resources. The mere claim that the Navy would avoid adverse impacts "to the maximum extent practicable" (see DEIS at 6-75) does not, of course, obviate consultation. Since sonar may impact sanctuary resources even when operated outside their bounds, the Navy should indicate how close it presently operates, or forseeably plans to operate, to each of these areas.

In addition, the Sanctuaries Act is intended to "prevent or strictly limit the dumping into ocean waters of any material that would adversely affect human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities" (33 U.S.C. § 1401(b)), and prohibits all persons, including Federal agencies, from dumping materials into ocean waters, except as authorized by the Environmental Protection Agency. 33 U.S.C. §§ 1411, 1412(a). The Navy has not indicated its intent to seek a permit under the statute.

(6) The Migratory Bird Treaty Act, 16 U.S.C. § 703 et seq. ("MBTA"), which makes it illegal for any person, including any agency of the Federal government, "by any means or in any manner, to pursue, hunt, take, capture, [or] kill" any migratory birds except as permitted by regulation. 16 U.S.C. § 703. After the District Court for the D.C. Circuit held that naval training exercises that incidentally take migratory birds without a permit violate the MBTA, (see Center for Biological Diversity v. Pirie, 191 F. Supp. 2d 161 (D.D.C. 2002) (later vacated as moot)), Congress exempted some military readiness activities from the MBTA but also placed a duty on the Defense Department to minimize harms to seabirds. Under the new law, the Secretary of Defense, "shall, in consultation with the Secretary of the Interior, identify measures-- (1) to minimize and mitigate, to the extent practicable, any adverse impacts of authorized military readiness activities on affected species of migratory birds; and (2) to monitor the impacts of such military readiness activities on affected species of migratory birds." Pub.L. 107-314, § 315 (Dec. 2, 2002). As the Navy acknowledges, migratory birds occur within the Atlantic Fleet's sonar use area. The Navy must therefore consult with the Secretary of the Interior regarding measures to minimize and monitor the effects of the proposed range on migratory birds, as required.

(7) Executive Order 13158, which sets forth protections for marine protected areas ("MPAs") nationwide. The Executive Order defines MPAs broadly to include "any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein." E.O. 13158 (May 26, 2000). It then requires that "[e]ach Federal agency whose actions affect the natural or cultural resources that are protected by an MPA shall identify such actions," and that, "[t]o the extent permitted by law and to the maximum extent practicable, each Federal agency, in taking such actions, shall avoid harm to the natural and cultural resources that are protected by an MPA." Id. The Navy must therefore consider and, to the maximum extent practicable, must avoid harm to the resources of all federally- and state-designated marine protected areas, including the national marine sanctuaries discussed above and the numerous other areas potentially affected by activities taking place along the East Coast and Gulf of Mexico.

The proposed activities also implicate the Clean Air Act and Clean Water Act as well as other statutes protecting the public health. The Atlantic Fleet's exercises cannot legally be undertaken absent compliance with these and other laws.

J. Conflicts with Federal, State, and Local Land-Use Planning

NEPA requires agencies to assess possible conflicts that their projects might have with the objectives of federal, regional, state, and local land-use plans, policies, and controls. 40 C.F.R. § 1502.16(c). The Navy's training and testing activities may certainly affect resources in the coastal zone and within other state and local jurisdictions, in conflict with the purpose and intent of those areas. The consistency of Navy operations with these land-use policies must receive more thorough consideration.

K. Alternatives Analysis under Section 102(2)(E) of NEPA

Above and beyond the EIS requirement, NEPA directs agencies to "study, develop, and describe appropriate alternatives" to any project that presents "unresolved conflicts concerning alternative uses of available resources." 42 U.S.C. § 4332(2)(E). Courts have concluded that this duty is "both independent of, and broader than, the EIS requirement." Bob Marshall Alliance v. Hodel, 852 F.2d 1223, 1229 (9th Cir. 1988), cert. denied, 109 S.Ct. 1340 (1989). Because the Navy's proposal presents "unresolved conflicts" about the proper use of "available resources," the Navy must explicitly address its separate and independent obligations under section 4332(2)(E).

III. CONCLUSION

For the reasons set forth above, we urge the Navy to withdraw its DEIS and to revise the document prior to its recirculation for public comment.

Very truly yours,

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